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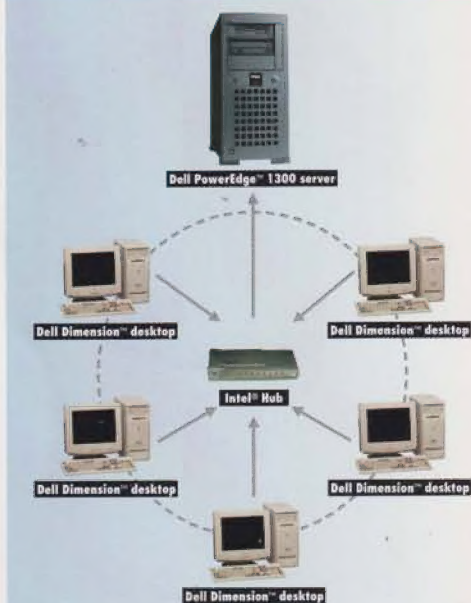
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Holier-than-thou traditional media claims online media is dodgy. The pot calling the kettle black?



Nathan Taylor

Nathan Taylor can be contacted at
apc@acptech.net.

Hegemonies and spin doctors

I'll spare you the 'you can't trust online media' speech. It's one that I'm sure you're familiar with. Most 'old media' organisations spit it out when they start to get worried about upstart competitors. However, the fact is that a large chunk of the traditional media is as dodgy as hell.

Advertorials (articles paid for by businesses that are presented as editorial coverage) are common in all kinds of print magazine publishing. One of APC's journalists was recently shocked to be asked how much it would cost to get a review in the magazine. We don't do that kind of thing — but I could name other publications that do. Fortunately, I also know many that react to such requests the same way we do: no way. However, many consumers can't tell the difference between these publications.

Magazines aren't the only perpetrators. You've probably seen television shows on which a large number of 'stories' are paid for (although this is not always made clear to the viewers). The same can be said for many newspapers, both here and overseas. Even excluding advertorials, many media houses are reluctant to publish negative stories about advertisers, or they make legitimate stories more prominent if they are positive. After all, it's good business.

These issues also affect online media. Some small online publications rely on the support of a few advertisers or sponsors, and their journalistic integrity can be compromised by this. Others are as straight laced and ethical as the best traditional media sources.

In mainstream media coverage, it's common to denigrate the Net and its contents: it's full of porn; kids can learn to make bombs; and the news coverage is editorially compromised. At APC, we're constantly called on to comment on Net issues for the mainstream media, and we always respond

in the same way: don't blame the medium. However, this perspective rarely makes it into the final article.

That said, the proliferation of media outlets has exacerbated one problem: company strongarm tactics. The IT industry is extremely marketing-driven. CEOs of big companies even have their own personal PR people. It's frightening, but not as frightening as the 'play nice' tactics being encouraged by more and more IT companies.

They do this by choosing favourite media organisations to reveal new bits of information to. They pick the people who they know are favourably disposed towards them, and feed them the stories. Anyone inclined to take a more critical viewpoint is excluded. Journalists have built careers on being 'in' with one company, and thereby getting the scoops on that company. Most of you are probably thinking of

The fact is that a large chunk of the traditional media is as dodgy as hell.

Microsoft by now — but you would be dead wrong. Apple is probably the worst offender, and nVidia is also earning a reputation as a media manipulator. Both have run up against some very negative feedback lately regarding the tactics they use to browbeat online and print media into covering them favourably.

With so much attention on IT now — in online and mainstream media — businesses are able to pick and choose their media contacts. This leads to softer coverage. It's a trend I find very disturbing, but no-one's really to blame. The PR people are only doing their job. I hope there will be a rationalisation of media soon that will sort out many of these issues, but I'm not holding my breath.

Both online and mainstream media are suffering from the increased prevalence of spin doctoring. Both are being compromised, and it's a problem that needs to be sorted out soon if people aren't to lose their faith in the media entirely. ■

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Price: **\$570.86**

Zip 250MB Parallel Port drive "Superfloppy" storage, holding 250MB data

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Zip 100MB USB drive

Plug and play compatible storage for PCs running Win 98 and MAC machines

Price: **\$195.62**

Zip 100MB USB Starter kit

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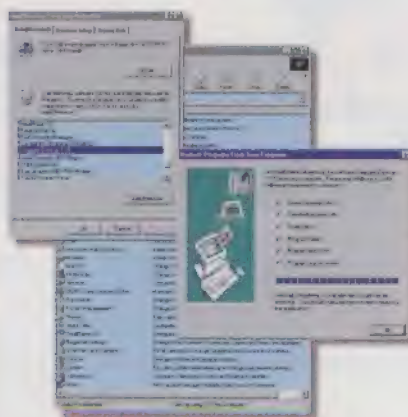
CYBERBLUDGING

Should bosses police Net use?



The Internet presents office workers with many opportunities for distraction, and employers fear the lure of recreational surfing and emailing jokes is a threat to productivity. In response, the market for Net access monitoring software is growing, but some say only poor managers rely on software to spot slack staff members. APC considers whether organisations should monitor their staff's online habits. Do employees deserve a break?

In Corporate IT 116



WINDOWS 2000

Out the Window

The big question mark when it comes to Windows 2000 is compatibility. Many people are keen to test its promise of increased reliability, but fear it won't run their existing software. Our Windows column explains how to find out if your software has compatibility problems with Windows 2000, and how you can work around these problems.

In Workshop 146

Net censorship: \$4,700 a site



Australia's controversial Net censorship scheme is again under fire, after the release of a report showing the Australian Broadcasting Authority received few complaints during its first six months of operation — and rejected most of them. Critics have also questioned the ABA's credibility, pointing to discrepancies between claims made in the ABA's official report and information released in August under a freedom of information request.

In Newswire 15



BANDWIDTH BOOM

Every broadband option tested

Broadband has finally hit Australia and access is gradually spreading throughout the country. Competition between Optus and Telstra has shaken up the industry, and smaller players are clamouring to provide alternatives. Net access is more affordable than ever, making superfast access a tempting proposition. APC Labs tests cable Internet, ADSL and satellite services, and provides tips on maximising speed and making the most of your connection.

60

GET A MOVE ON

Mega handheld PC review

Handheld devices are going places, and the latest crop have features you could only dream of. Need to display images, play music or have your handheld PC double as a phone? No worries. There is also good news for the budget conscious: basic organisers are cheaper than ever. APC looks at the hottest developments in mobile data managers and reviews the 15 best models on the market.

84

SERVICE & RELIABILITY SURVEY RESULTS

The best and worst ISPs

How do APC readers use the Net, and what do they think of their ISPs? The results from this year's ISP Service and Reliability survey show that our readers are venturing online more often and staying there for longer. Some ISPs attracted complaints from their customers, but generally ISPs have shaped up in the last year. APC reveals which ISP came out as top dog in the survey results.

70

Crunch time for Apple

With sales down, Apple may need more than pretty colours to survive into the next century. APC Labs checks out its two latest products — the long-awaited Mac OS X and the much-discussed G4 Cube — to see if they hold the key to the computing pioneer's future.

54

NET TELEPHONY

Call Waiting

Making free phone calls to anywhere in the world sounds too good to be true, but the right service could rescue you from hefty phone bills. APC examines the real costs of PC-to-PC and PC-to-phone services and tests seven locally available options.

102



CONSOLE SHOOTOUT Sony takes on Sega

PlayStation2 and the Dreamcast are competing fiercely for a place in your lounge room. The latest generation of consoles have enticing new features, but some gamers have waited a long time for these releases and are bound to be disappointed with their limitations. APC reviews three of the latest release consoles and looks ahead to the future of gaming devices.

In After Hours **206**



STORAGE DEVICES Infinite space and speed

Hard disk storage capacity has been increasing at a fantastic rate, but magnetic disk technology is about to reach its limit. Researchers are perfecting a range of alternatives and fascinating new technologies are emerging.

110



Tripping the light WAntastic

Developments in optical networking are taking bandwidth to staggering new limits. New fibre-optic networks are using optical transmission technologies to make high-speed WAN services a practical reality. It's no wonder corporations are rethinking their bandwidth options and the optical market is surging ahead.

In Corporate IT **128**

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What's hot on APC November CDs

For a complete listing of programs featured on the November CDs, see the CD sleeve.

PATCH PANEL

Microsoft Service Pack 1

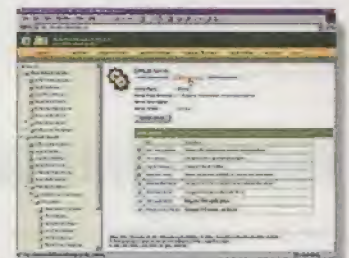
This is a collection of updates and fixes that patch Microsoft Windows 2000. The fixes relate to application compatibility, more reliable system operating, security updates and Windows 2000 setup changes.

Please note that the release of the Windows 2000 Service Pack 1 on this CD is a one-off ACP Tech exclusive. It is still Microsoft policy that Microsoft service packs are not to be released on magazine CDs. There will be no other Microsoft service packs on APC CDs until further notice.

Allaire JRun Server 3.0

This complete Java application server is for running enterprise and ecommerce applications. JRun Server delivers the full capabilities of the Java 2 platform Enterprise Edition (J2EE) specifications. JRun enables developers to add the functions of server-side Java to existing Web servers.

Windows 2000 Service Pack 1



INTERNET SUPERKIT

CD 2 supplies everything you need for the Net: FTP clients, download managers, email clients, antispam tools, media players and much more.

Browsers galore

If you want to extend your browser options, look no further. Choose from fully integrated Net suites, as well as conventional and unusual browsers: ExpressBrowser 1.0.0, Microsoft Internet Explorer (32 bit) 5.5, NeoPlanet 5.1.0.1531, NetCaptor 6.02, netomat, Netscape Communicator 4.75, Netscape Navigator 4.08, Opera 4.02.



Your guide to the cover CDs

The APC cover CDs complement both the magazine and apcmag.com. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and Web browsers.

Each piece of software includes instructions on whether you will need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included on the CD cover.

The CDs have been created in HTML. You do not need any special software to access the CDs, other than a standard browser.

The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the CDs is provided as is, without any warranty, expressed or implied. Complete terms and conditions are included on the CD; click on the Conditions of Use link for details.

How to run the CDs

Before using the CDs, please read the Conditions of Use online at apcmag.com/apcmag.cd. These CDs use an Autorun feature for Windows 95, 98 and NT systems. Just insert a cover CD and your browser will automatically load with the APC CD front page. Users of other platforms can simply launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD. For further information, see the instructions on the back of the CD insert.

You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

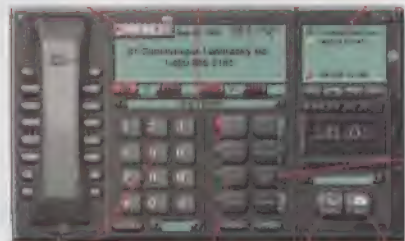
While APC has taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

If you have any problems, refer to the Help section on the back of the CD insert.

INTERNET SUPERKIT

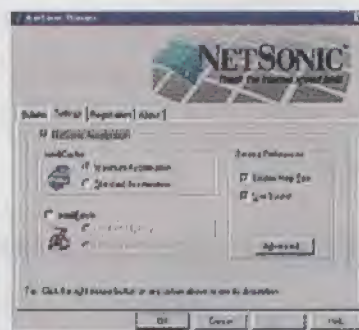
Net telephony

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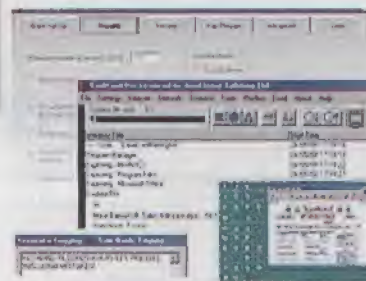
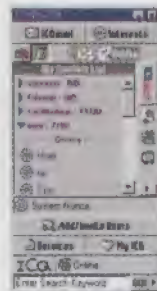
Net optimisers

Broaden your surfing capabilities with this selection of Net optimisers and tweakers. Improve Internet speed, load Web pages faster and more efficiently, and reduce times in downloading files, graphics and more: Accelerate 2000 1.0, DNTools 2.0, FastNet99 3.1, InterQuick 2.1, Modem Booster 2.1, NetSonic 2.50, SpeedNet 4.1, SpeedTec 2.0, TweakDUN 2.23, Webcelerator 165.



Instant messaging

The latest versions of popular chat clients are all here: AOL Instant Messenger (32 bit), CheetahChat 6.3a, ICQ 2000a Beta, mIRC 5.71 (32 bit), MSN Messenger Service 3.0, Odigo 2.5, PalTalk 3.0, PowWow 4.2.1, Yahoo Messenger 814 Beta.



Security tools

This selection of security applications will help provide protection for your system and files: 007 Password Recovery 2.0, BigSecret 4.2, BlackICE Defender 2.1, File Protector 2000 Special Edition, Nutcracker 1.0, RedHand Pro 6.00, SSH 2.0.13, The Block 2.1, Ultimate ZIP Cracker 5.1, VSE My Privacy 1.2.1, ZoneAlarm 2.1.25.

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Our main Web site **apcmag.com** is probably best known for its complete archive of all articles published in the magazine, making it easy for readers to check earlier columns in our Workshop tutorials or find reviews of recently released products.

Others regularly drop by **newswire.com.au** to catch the latest technology news and developments, while hundreds of thousands of people have made the APC start page (now located at **apcstart.com**) their home base for quick access to the best Web sites about.

However, there's much more to our sites than that — enough to bring you back every day of the week!

- On Mondays, catch the latest news from Asia in **Newswire's** weekly Asia Roundup, extend your technology knowledge with 5 Minute Guides, or follow our attempts to run an adult site in Xperiment.
- Tuesdays see new First Take reviews posted, while Angus Kidman ponders the state of technology in his thrice-weekly DisGust column.
- On Wednesdays, the Beta Beat highlights the latest cool software to try out.
- Thursdays are dominated by Walter Wombat's rumour roundup and APC's weekly editorial.
- On Fridays, get the latest games news with Gamespy, and explore the impact of new technologies on our everyday lives with Simon Vandore.



Conditions of entry

These conditions apply to all competitions in APC November, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC November. Entry is free and open to all residents of Australia other than employees of APC Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail November 21. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of APC Publishing Pty Limited, the promoter, 54 Park Street, Sydney NSW 1028. The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring between the publishing date and the date the prizes are claimed is not the responsibility of the promoter. Winners will be notified by security post and their names published on **apcmag.com**.



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Net censorship: \$4,700 a site

Questions raised over reporting

A report on Australia's Internet censorship scheme after six months of operation shows that the Australian Broadcasting Authority (ABA) received just 201 complaints and rejected more than half of them. The controversial scheme requires local ISPs to remove content if the ABA deems that it would receive an X or RC rating.

According to the report, 197 of the 201 complaints received had been investigated by the end of June. Of these, 37 were dismissed due to lack of information, but 93 were found to feature prohibited or potentially prohibited content. Two-thirds of the complaints concerned sites hosted outside Australia, which fall outside the ABA's jurisdiction. A total of 62 takedown notices were issued.

The ABA has been allocated \$1.9 million for this financial year to run the scheme. This averages out at about \$4,700 per complaint for the half-year so far. Currently, five full-time staff are employed to run Net regulatory activities.

Of the 62 sites banned, 11 featured sexual activity, 33 featured paedophilic material or an offensive depiction of a child, and 18 featured "offensive or abhorrent sexual activity". Although one of the main justifications for introducing the law was to restrict access to information on topics such as bomb-making, no complaints falling into the "detailed instruction in crime" category resulted in a takedown notice.

The government has not issued details of which sites were complained about, what led to the 37 cancelled investigations, or whether the banned sites subsequently rehosted themselves overseas.

Activist group Electronic Frontiers Australia (EFA) has been highly critical of the report. EFA lodged a freedom of information request with the ABA earlier in the year to discover details of which sites



had been banned, and was eventually provided with a heavily censored set of documents in August. Some of the figures in those documents don't match the claims made in the ABA's official report.

The report also notes that, while most larger ISPs have complied with the code of practice proposed by the Internet Industry Association, smaller ISPs have been less keen. The code was introduced to prevent the more draconian provisions of the censorship rules, including a technically unfeasible requirement that ISPs block access to individual sites, coming into play. The ABA said it had been in contact with more than 800 ISPs, but did not provide details of which ISPs had complied.

IT minister Senator Richard Alston said the fact that a total of 95 items of content had been referred to either federal police or overseas authorities showed the importance of regulation. "These statistics clearly demonstrate that, despite ongoing criticism from a vocal minority, the scheme is addressing very serious online content issues," he said in a statement.

Angus Kidman

News roundup

Optus cracks down on cable usage

In recently announced changes to the Optus@Home cable Internet acceptable use policy, subscribers who exceed 10 times the 'average customer usage' (a constantly changing download limit) will have their account terminated without notice. The figure is determined by averaging the download usage of all subscribers over a rolling 14-day period. The top and bottom 5% of downloads are removed from the calculation and the average of the middle 90% of results is taken.

If the limit is breached, "Optus will be entitled to immediately terminate the supply of services to you without further notice," the new policy reads. Subscribers were informed that if they didn't agree with the changes, in effect from October 31, they could have their installation fee refunded and their contract terminated with no penalty, on one condition — that Optus be able to repossess the cable modem. A number of subscribers have expressed dissatisfaction with the new system.

Maxtor buys Quantum's disk arm

Hard drive manufacturer Maxtor is set to buy out the hard drive business of rival Quantum in a \$US2.3 billion stock swap. The merger is expected to close early next year, and is likely to result in Maxtor taking the top spot in global drive shipments. Quantum is not selling off its storage and backup systems group, a wise move given the company's recent fiscal history. In its most recent quarter, the hard drive business accounted for \$US864 million in revenues and \$US16 million in net income. While the storage business had a lower revenue of \$US366 million, its net income was \$US44 million. Maxtor CEO Mike Cannon will continue to head up the company, which will retain the Maxtor brand, while Quantum CEO Michael Brown will join its board of directors.

High-speed US link draws near

Price of high-speed Internet is set to fall

Australians can expect faster and cheaper Internet access when a high-speed link to the US opens this month.

The Southern Cross Cable network will provide 120 times the capacity of the existing link to the US, and will have a one-way transmission delay of 70 milliseconds. "What it will mean for the end user is faster access and the opportunity for more downloads, as well as price competition," WorldCom Australia managing director Suzanne Campbell said. "At the wholesale level there is already price movement." However, Campbell admitted the download speed and price outcome for Australian consumers will vary depending on the strength of the domestic network and the pricing arrangements of Internet service providers.

WorldCom is rolling out the network in partnership with Telecom New Zealand and Optus.

Officials have also had to address the question of how to repair the 1,500km cable, which is buried in the seabed, if it



becomes damaged. A 7-tonne robot named ROV (remote operated vehicle) has been fitted to the maintenance vessel CS Pacific Guardian. The robot will bring the cable up for repairs whenever a fault is detected.

ROV is equipped with a robot arm, which allows it to cut the cable and attach recovery lines. Once repaired onboard the CS Pacific Guardian, the ROV will then rebury the cable. ROV is capable of working up to 2.5km under the sea.

WorldCom is also planning to build a submarine fibre-optic cable network linking Australia directly to Japan.

Also in the pipeline is a \$US800 million high-speed loop between the major South-East Asian cities.

Fiona Angus and William Maher

Oz IT production lags

Australia is ranked second worldwide in terms of expenditure on information technology, but this performance isn't matched by production of IT equipment, according to a study on the development of the IT-centred 'new economy'.

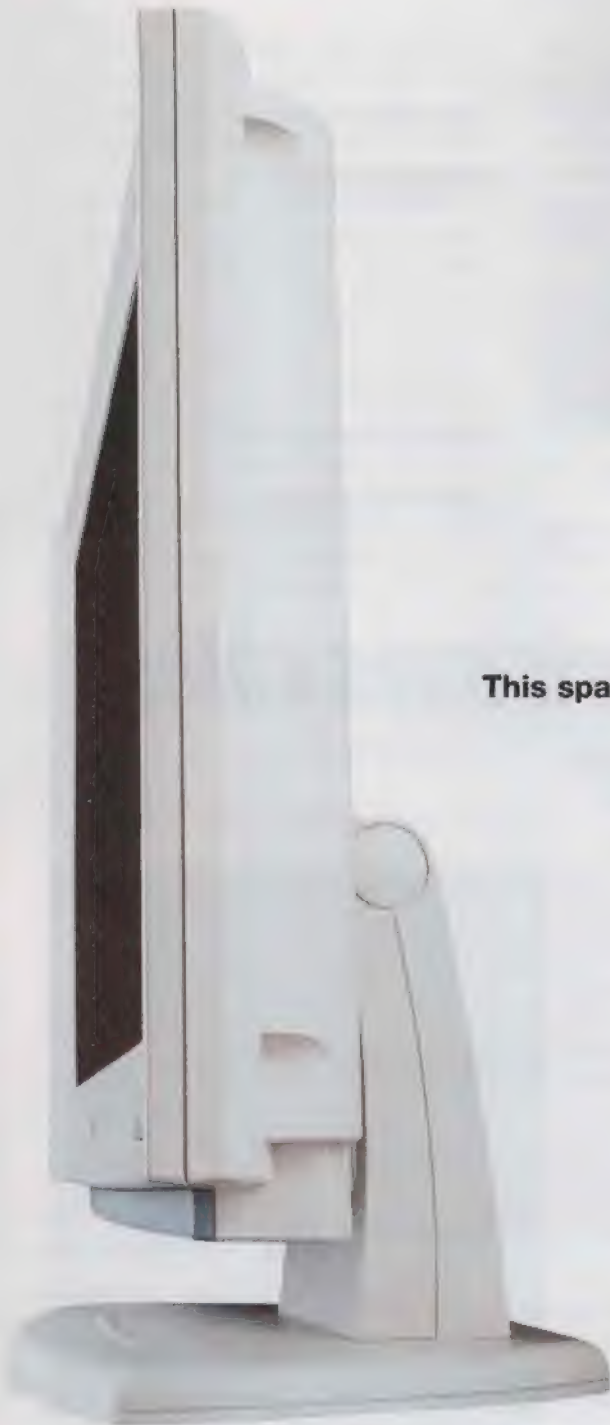
About 9% of Australia's gross domestic product (GDP) is spent on IT and communications technology. This puts Australia second in the world according to the World Economic Outlook report, issued by the International Monetary Fund (IMF). Sweden topped the rankings, while Australia narrowly beat the US and the UK.

However, of the 19 advanced economies considered in the report, Australia ranked second last (along with Norway) when it came to production of IT. Only Denmark had a smaller IT production base. "IT spending as a share of GDP is extremely high in Australia, but production of IT equipment is a small share of total output," the report states.

The IMF also issued a warning that the massive growth seen in the US economy as a result of the IT boom might not be quickly reproduced elsewhere. "In principle there is no reason why IT in Australia should not play a role similar to that in the United States, with the exception in many cases of the contribution of the IT equipment sector," the report said. "The timing will depend on several factors, however, including a high rate of investment in IT capital and a supportive environment."

The report was welcomed by government officials, who said that it demonstrates how IT had helped boost local productivity and efficiency. However, the IMF noted that many of the productivity gains seen in Australia in recent years could be better attributed to general trade reforms, rather than the specific uptake of IT.

Angus Kidman



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News roundup

McNealy: Aussies need a niche

Sun CEO Scott McNealy believes Australia lacks a clear identity in the high-tech world and needs a "digital tagline". Addressing the National Press in Canberra, the billionaire said that just as the US has Silicon Valley and Scandinavia is a centre for wireless technology, Australia could improve its standing in the new economy by becoming known for something. McNealy suggested Australia could try to become the digital media capital of the world, as it is already home to huge media empires like News Ltd and PBL. Sun announced a \$US50 million venture capital investment divided between Australia, Japan, New Zealand, Korea and Taiwan, through its new Asia Pacific Venture Investment.

Larry closes in on Bill

Speaking of billionaires, Bill Gates had better enjoy his slot as the richest man in technology while he can. According to the annual Forbes 400 listing of the richest people in the US, Microsoft chair and founder Gates remains top of the tree for the seventh consecutive year, with an estimated net worth of \$US63 billion. However, the big development is the rapid rise of Oracle CEO and Gates' arch-nemesis Larry Ellison, who last year was ranked at number 12 on the list with a \$US13 billion fortune. This year, Ellison has rocketed to second place on the list with \$US58 billion, just \$US5 billion behind Gates.

Apple clicks with shock shopping deal

The furore over a patent covering online shopping held by eetailing giant Amazon.com has been reignited by — of all companies — Apple. The colourful computer company has become the first company to license Amazon.com's 1-Click shopping feature for use in its online store. Amazon.com caused a wave of controversy when the patent was approved last September.

Austar mops up EISA

Regional pay TV and broadband provider Austar has bought failed ISP EISA for just \$13 million — after originally offering almost twice that amount.

In September, Austar's \$24.4 million bid to buy 90% of EISA shares at 20 cents each failed. Weeks later, EISA was on the verge of a financial collapse and was forced to appoint a voluntary administrator.

Austar then stepped in with its cut-price offer. "We are sorry that it had to happen this way, but we are pleased with the final result," Austar spokesperson Bruce Meagher said. EISA's downfall was the result of over-stretched resources when its attempt to buy Australia's second-largest ISP, OzEmail, failed.

Concerned about getting none of their money back, creditors quickly agreed to

accept Austar's offer of \$13 million. Creditors, including Telstra, Optus, Primus, Blue Sky and KPMG, will now receive 45% to 60% of what they are owed, according to EISA's administrator Andrew Love of Ferrier Hodgson.

Austar has already assumed the day-to-day running of the failed ISP. Meagher said the EISA business is in good shape, "given that the company has been through a traumatic few months". Austar expects to retain EISA's 100 staff, "except for a few in Sydney," Love said.

On its final day, EISA traded at 14 cents — a fraction of the \$3.18 price tag the stock carried earlier this year. As a result of its collapse, EISA will be delisted from the Australian Stock Exchange.

Fiona Angus and Roulla Yiaccoumi

Online Christmas sales set to soar

Sales from online retailers are tipped to grow by more than 90% in the Asia-Pacific region during this year's Christmas shopping period. However, when it comes to eetailing, the US is way out in front.

New figures from research firm Gartner suggest that the total market for online shopping this Christmas will top \$US19.5 billion. This is a jump of 85.5% on last year. Sales in the Asia-Pacific region will grow by 90.5% and represent 8.2% of global sales.

The US will account for 54.9% of total sales during the fourth quarter, Gartner predicts. The strongest growth will be seen in Europe, which is expected to rise by 96.4%.

In a bid to boost sales this Christmas, one customer relationship management company is urging eetailers to take advantage of email as a potent marketing tool.

According to Sean Kearns, director of marketing at Talisma, companies usually send out mass emails or advertise extensively to promote the products and services on their Web sites. However, by promoting one-to-one contact through personalised emails, eetailers can expect a much better response. This targeted and personalised emarketing is "fundamental



to the success of every eetailer's holiday promotions strategy," Kearns said.

One of the downsides of direct marketing by email is the negative association it has with spam. However, Michael Foot, regional director of Premiere Information Systems, which offers a direct email service for eetailers, said this kind of mass marketing is easy when customers have volunteered information to eetailers about themselves.

Howard Dahdah and Angus Kidman

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News roundup

Compaq expands Adelaide operation

South Australia has beaten both New South Wales and Queensland to win a significant contract from Compaq. The computer company will establish a customer service centre in Adelaide, as well as expand its existing application development and integration centre. The project is expected to generate 235 jobs over the next four years.

Hewlett-Packard considers Pricewaterhouse buy

Hewlett-Packard is contemplating splashing out \$US18 billion to purchase the consulting arm of PricewaterhouseCoopers (PWC). Hewlett-Packard officials have confirmed the company is considering the buy, which would reinforce its ability to compete for large enterprise accounts with companies such as IBM and Compaq. PWC has previously said that it wants to split off its consulting division from its accounting services. The deal, if finalised, would involve a cash and stock swap valued at up to \$US18 billion. Hewlett-Packard officials said that the purchase will boost earnings, but will lower earnings per share in the coming financial year.

Official Olympics site a hit

It seems the world couldn't get enough of the Sydney 2000 Olympics online. IBM, which designed and developed the official olympics.com Web site, received 11.3 billion hits over the period of the Games. This translates to over 8.7 million unique users viewing a total of 230 million pages. While live streaming video coverage contravenes International Olympic Committee (IOC) rules, sports fans were able to access results as they happened. After the Atlanta games debacle, IBM is happy to be going out on a bang. It ends its relationship with the IOC on December 31, 2000. The IOC has chosen a variety of hardware and technology partners for the 2004 Athens Olympics, tipped to be the 'broadband games'.

Pick up your act

Technology companies listed on the ASX have been warned over disclosure problems

Directors of many listed technology companies do not have sufficient business experience to run listed companies, a new study has found.

According to the joint study by the Australian Securities and Investments Commission (ASIC) and the Australian Stock Exchange (ASX), many of these companies do not even have a basic understanding of the disclosure requirements associated with being a listed company.

Many companies fail to hold regular board meetings, or even to produce monthly profit and loss or cash flow statements. Some did not realise they were obliged to make announcements when the companies underperformed. ASIC has blamed ignorance and an excess of entrepreneurial spirit for the failure of many technology company directors to reveal massive financial losses.

The director of ASIC's national markets unit, Claire Grose, said that the directors of some technology companies that have used the ASX to raise cash are more interested in making money than balancing the books. "After listing, they may have priorities other than running their day-to-day business. These are people who might be more focused on entrepreneurial activity," she said.

Grose said that smaller and newer companies do not have the experience of larger companies and are often ignorant of their obligation to disclose sensitive information. "It was something we thought we needed to focus on, and the results show this was the case." Under new laws about to go before Federal Parliament, ASIC will be able to pursue civil action against individual directors who do not follow disclosure rules.

Following the investigation, ASIC named Spike, Travelshop and Isis Communications as nondisclosure offenders. After discussions with ASIC, Travelshop revealed it lost over \$3 million more than what was predicted in its float prospectus. The company had also undertaken a

major internal restructure of its staff and business deals.

Spike was pushed into revealing a \$26.9 million loss after a visit from ASIC, also well beyond prospectus predictions. Like Travelshop, Spike had dumped key members of management and scaled back its business activities.

Isis also lost \$15 million in operating and investing costs in the 6 months to June 30. This prompted the company to scale back staff, marketing and development initiatives.


ASIC will use the study to argue that the upcoming Financial Services Reform Bill should give it the power to impose penalties when companies fail to make adequate disclosures. Companies are required to inform the market of any information which may affect their share price.

WHO MADE MONEY



Telstra**	\$3.7 billion
MYOB*	\$20.6 million
Intellect**	\$10.1 million
Internet Travel Group**	\$3 million
Netcomm**	\$558,000
MultiEMedia.com**	\$243,000

WHO LOST MONEY



One.Tel**	\$291.1 million
Spike Networks**	\$26.9 million
AdultShop**	\$15 million
Jumbomall.com**	\$12.5 million
ChaosMusic**	\$6.1 million
Kidz.net*	\$3.2 million

* For the six-month period ending June 30, 2000

** For the 12-month period ending June 30, 2000

In related news, many listed companies reported miserable results to the ASX for the period ending June 30, 2000. One.Tel led the poor showing, recording a net loss of \$291.1 million for the year. The controversial loss included bonus payments of \$US4.5 million each to two directors. ASIC later forced One.Tel to explain why the large payouts were made when the company was reporting such a significant loss.

Angus Kidman, Fiona Angus,
and Roulla Yiacoumi

And the winner is...

DIAMOND VIEW

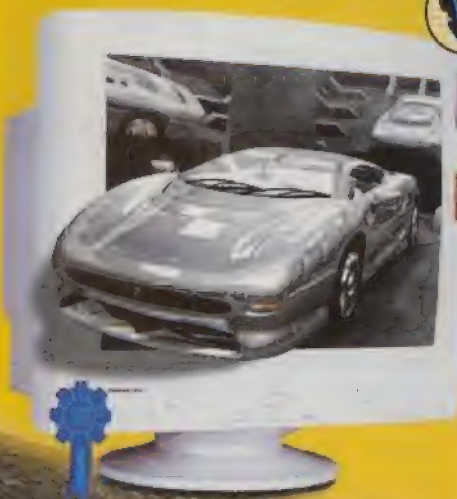
2107

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ITgraphics
1999 Awards

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DIAMOND VIEW

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IT outsourcing may have left the government in the red, but it's pushing ahead with plans for more.

Outsourcing fails to deliver

A report by the Australian National Audit Office (ANAO) has found that many of the savings that were promised in IT outsourcing contracts have failed to materialise.

The long-anticipated report was particularly critical of delays in the implementation of the outsourcing project and faults in the methods used to select the most competitive tenders. "Implementation... is now expected to be completed in 2001, some two years after the initial date, and to cost nearly three times as much as was originally budgeted," it said.

The delays have been particularly damaging as department budget cuts have already been made, despite no outsourcing taking place. "For some agencies, budget reductions will have been in effect for up to two years before the competitive tendering process is complete," the report noted.

The Federal Government originally predicted outsourcing would save taxpayers \$1 billion, but three department clusters have been forced to fork out nearly \$25 million extra. The report showed a major blow-out in the cost of managing the initiative, which was originally forecast to cost \$13 million, but has already reached \$33 million. The government paid one US outsourcing advisor \$26 million alone.

The ANAO found that the methods used to estimate cost savings — expected to total more than \$99.2 million in the current financial year — did not accurately reflect the costs associated with the outsourcing program. It also found that, in many cases, implementations had resulted in "significant service delivery difficulties for extended periods". The report questioned the ability of the outsourcing contractors to provide accurate and detailed invoicing, and said more justification was needed for the payment of \$7 million to strategic advisors on the project.

The 247-page investigation into the government's \$1 billion outsourcing program was originally expected to cover 12 separate tenders, but only four had been completed by the time the investigation began last July, and one of those, for Employment National, was abandoned.

Of the three active programs considered, the projected savings for the Australian Tax Office were overestimated by 52%, while



those for Cluster 3 (which covers half a dozen departments) were overestimated by 2%. Group 5 agencies had their budgets cut in expectation of savings from outsourcing, but only 80% of those savings were realised, and actual costs rose by 7.3%. Group 5 is serviced by Advantra, Cluster 3 by CSC and the ATO by EDS.

The outsourcing proposal has been an ongoing problem for the government since it was introduced in 1997. Most recently, the CSIRO has protested plans to outsource its IT systems, saying that it could affect research quality. Despite this, the Federal Government will proceed with further IT outsourcing plans.

The minister responsible for outsourcing, John Fahey, said the decision to outsource remains "fundamentally sound" and that he is "satisfied that the IT Initiative's stated objectives are being achieved". Fahey said the government will go ahead with further outsourcing, including IT support for the CSIRO and other scientific research agencies.

Scientists from the research agencies are trying to prevent the dismantling of their specialist inhouse IT support. CSIRO staff association assistant secretary Dr Pauline Gallagher, said the report vindicates the protest and justifies the scientists' fears that outsourcing will cost more and reduce service levels. "The report showed a lack of understanding by the Office of Asset Sales and Information Technology Outsourcing (OASITO) and the providers," she said.

"Add to this the poor service record of the existing contract providers, their failures to set up and maintain adequate security of IT systems, and questions about whether the providers have the capability to meet government agency needs, and you have a recipe for disaster for public science," she said. "Any company that knew what it was doing would put this in the too-hard basket."

Fahey indicated he will adopt most of the recommendations in the report, but disagreed with the conclusion that the outsourcing process should be more open and accountable.

One company named in the report, Advantra, indicated it will be guided by the government following the release of the report. "IT outsourcing contracts of this size require a very rigorous and complex negotiation period. Advantra has been happy with the process put in place by the government and OASITO during the tender evaluation period and also during the delivery phase on this contract," the company said in a statement.

The service provided by the IT businesses under the outsourcing contracts has been extremely patchy, according to Community and Public Sector Union national president Matthew Reynolds. He said there are regular reports from members frustrated by poor IT support services — in one instance, an entire department failed to get paid, while a major systems failure shut down the Health Insurance Commission for four days.

Angus Kidman and Fiona Angus

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COMPUCON

Crunch time for Apple

Can the new-look Mac OS X and the G4 Cube help revive Apple's fortunes?

Apple Mac OS X Beta

When it was introduced in 1984, the Mac's most distinctive feature was its graphical user interface. GUIs weren't a new idea then, and today their value as a marketing tool is marginal at best. This makes Apple's emphasis on OS X's GUI, dubbed Aqua, hard to understand, especially when all the real action is happening under the hood.

The story of OS X is well documented. It's Apple's third attempt to rebuild the Mac OS. Based around the MACH 3.0 kernel and a customised version of BSD 4.4, it's available as a public beta release which expires on May 15, 2001.

Core system services are provided by a MACH/BSD layer known as Darwin. It is available as an open source download because Apple is hoping to encourage free development input from the open source community. It's also possible to get Darwin up and running on Intel hardware. However, Apple remains adamant that it will never build Intel-based machines.

On top of Darwin is the tripartite graphics and imaging engine. The Quartz 2D graphics engine delivers PDF as a native imaging engine, while OpenGL is used as the operating system's 3D environment. QuickTime is also thrown in.

Next are the development environments. Classic is basically an emulation engine that provides backward compatibility with existing Macintosh applications, and Carbon is a quick solution for developers wishing to rapidly port their applications to the new environment. Cocoa is an object-oriented application environment. Applications written to Cocoa standards will be able to take full advantage of OS X. Java2 is also incorporated at the system level.

APC ran Mac OS X public beta on a PowerBook 500 equipped with 128M RAM and a 12G hard disk drive that provided the recommended 1.5G for the installation of the OS. We're unable to comment on the installation process as the PowerBook was delivered to APC with the OS already in place.

First-time users are automatically

granted administration rights, and can set up accounts for other users. It's unclear how powerful these administration rights are, but we suggest taking the recommended Unix route and setting up a basic user account for the day-to-day running of the machine. Pass this hurdle and things get interesting. There's a blank desktop, a menu bar running across the top of the screen and the Dock, a place where minimised applications, folders and the Trash icon reside.

The blank desktop is a little confronting, and Apple should populate the environment with a few basic icons — hard drive/my computer and a documents folder — for the final release. All drives can be viewed in a single window, which can be thought of as a Finder/Windows Explorer hybrid. This is where Apple expects you to spend your time between applications. This is fine, but Mac users tend to be rather set in

their ways, and a few preinstalled desktop icons would go a long way. It's not that you can't place things on the desktop (with the exception of Trash, which won't budge from the Dock), but it is clear that the desktop has become secondary to the file management system.

In the past, Apple has never asked anyone to understand how the Mac OS file system worked. It never required any thought, and although this led to some messy computers, it was also easy and intuitive. OS X asks more of you, and in doing so it loses some of the best features of the original OS.

The Classic environment posed some significant questions during APC's brief trial period. In short, we managed to kill it, and because none of the disks were to hand, we could not figure out how to resurrect it. This meant that we couldn't install any of the old Mac OS applications. This is a pity, as we were very curious to see how our usual Mac destroyer, Lotus Notes, fared in the emulated environment. It also meant that we couldn't read the PDF reviewer guide, which required an Acrobat reader running under the Classic emulator.

Because most people will spend a lot of time within the Classic environment (there



aren't many Carbonised or Cocoa compliant applications yet), we recommend proceeding with care and installing the OS into a separate partition, if possible. Despite our best attempts, OS X couldn't be killed. This doesn't mean it's invincible, but for a beta it appears to be quite stable.

And what about Aqua? It's just another interface. A nice one, admittedly, but its emphasis on colour and animation could become tiresome after a while. Most of the colour options can be toned down and the animation can be turned off. Better still, there's a command line environment where the Unix-savvy can key to their heart's content. POSIX compliance means that CLI applications can be easily ported. However, standard GNU development tools aren't shipped with the beta. It is possible to roll the Darwin tools into OS X, but it's not a task for the faint-hearted. Members of Apple's Developer program will be shipping development tools in the next few months.

Apple fans have gotten by for a long time without protected memory and pre-emptive multitasking. Mac OS X fixes this and in doing so firmly brings Mac OS into the realm of modern operating systems. Whether this compensates for the slightly less intuitive user environment remains to be seen. The amount of time the average user needs to spend in the Classic environment means that, for now, OS 9 is the better choice for day-to-day computing. Apple expects OS X to go gold early next year.

Josh Gliddon



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|-------------|--|
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Shiny new interface |
| Cons | Questions over Classic's durability
Price |

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Ever since he returned to the company full time in 1997, CEO Steve Jobs has been credited with helping to restore Apple's profitability and its reputation for cutting-edge design. Successes such as the iMac kept both investors and users happy, and even alliances with Microsoft were generally accepted by the Mac faithful.

However, recently there have been disturbing developments in the Apple camp. Apple's attempts to track down and prosecute staff who leaked product information didn't represent the best PR, but even worse was the company's announcement that its revenue would be substantially lower than anticipated due to flat sales worldwide. Has the Jobs dream come to an end? APC Labs examined the two most recent releases from Apple — the Power Mac G4 Cube and the long-awaited Mac OS X — to gauge where Apple's future lies.

Power Mac G4 Cube

The PC market is primarily driven by the need to put bigger and more impressive-sounding numbers on the ends of processor specifications, but the Macintosh market is nowhere near as number retentive. Hence, when a PC owner looks at Mac specifications, the temptation is there to scoff at the 450MHz processor, a reasonably low specification in the new PC market. However, this ignores the different way the system hardware works and the speed of the clock is not as important as how well an application is written to take advantage of the entire hardware

package. For G4 Macs, the altivec/velocity instruction set is the key determinant.

The G4 Cube is one of the most impressive-looking machines APC has seen for a long time. The unit is tiny — smaller than some PC speakers. All of the connections are on the base of the unit and the Cube is embedded in a perspex box with a gap at the base and back to accommodate the cords. The top of the system has a slot for DVD/CD use. One good design consideration is the trayless drive's dustcover. The power switch, which is also on top of the Cube, caused much hilarity (and a few grumbles of annoyance) at APC. It's not a switch as such; it's a touch-sensitive pad that glows when you press it. Unfortunately, it's all too easy to press it (and suspend the Mac) while using it, and like PCs, Macs aren't always reliable when coming out of suspension mode.

The G4 Cube comes with the Apple Pro Mouse, an optical mouse with a difference: no buttons. The entire mouse is 'clickable', thanks to an angled plate at the base of the mouse. This worked well for most applications, but heavy-handed users or those who like to grip their mouse tightly might have problems with it. The short mouse cable that comes with the Pro Mouse is a definite drawback.

The speakers certainly sound good considering they are so small, and are a definite talking point.

The Cube APC examined also came with a Studio Display flat-panel monitor, one of the best LCD monitors we've ever seen. It's not included in the system price, and will cost an additional \$1,995. It uses an ADC USB cable to connect to the Cube, giving it both a visual and power connection.

The G4 Cube has USB, FireWire, ADC and VGA connectors built into the base. However, the G4 Cube is the iMac of G4 Apples: attractive, but with limited scope. The unit APC looked at had only 64M of memory. It's common for Apples to ship with not enough memory, but this shouldn't extend to the top-line machines. The Cube's size prevents most expansion options and there are no PCI slots.



Processor	Power PC G4 450MHz
Secondary cache	1M
RAM	64M SDRAM
Hard disk	20G Ultra ATA
Hard disk file system	HFS+
Graphics card	ATI Rage 128 Pro
Video bus type	AGP
Video RAM	16M SDRAM
Video controller chip	ATI Rage 128
Monitor	N/A
CD/DVD-ROM drive	DVD-ROM
Modem/network	56K V.90 internal/10/100BaseT Ethernet
OS available	Mac OS 8.6, 9, X
Warranty	1 year
Connections	2 FireWire, 2 USB, VGA connector

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Because the power supply is external, there's less heat buildup, and all exhaust heat comes out of a slot at the top of the Cube. This means that the Cube, like the iMac, is extremely quiet — if the pulsing light on the top of the unit didn't come on, you wouldn't know it was working. The G4 Cube comes with OS 9, but its internal architecture will suit OS X.

Apple's positioning for the G4 Cube is a little odd. The iMac was a success for two reasons: it looked good, and despite the uncomfortable mouse, was easy to use. However, its appeal to Mac enthusiasts was limited; in their eyes it was an underpowered system. The G4 Cube is basically just a Power Mac G4 in a funky box. If you're willing to give up the flexibility of the basic G4 design, then the G4 Cube is a solid purchase — otherwise, go with the standard G4.

Alex Kidman

Pros Styling
Compact
Cons Limited upgradability
Power button too easy to switch off

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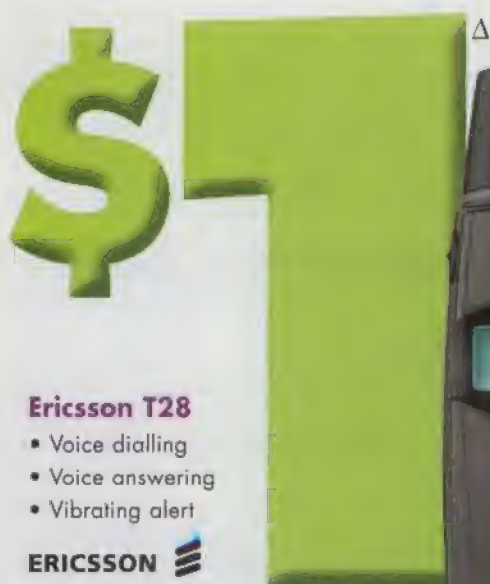
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Photoshop 6.0

If you're in the Web or graphic design industries and haven't heard of Adobe Photoshop yet, you need to get with the times. Adobe Photoshop has become the leader in image editing software. Photoshop 6.0 is a professional application, but its new simplified layout allows the home enthusiast to create images without the need of a manual. At the same time, it challenges professionals with new design features that will have users of Photoshop 5.0 burning with jealousy.

In versions of Photoshop before 5.0, text was typed into a separate window and then rendered in layers on top of the image. If mistakes were made in the spelling or wording, the layer had to be deleted and written again. Photoshop 5.0 introduced text that could be edited, but retained the need for a separate window. In Photoshop 6.0, text is displayed and edited on canvas. A new toolbar at the top allows you to change text colour, text styles, formats and fonts much as you do in Microsoft Word or InDesign. It also enables access to the new Warp Text menu.

The Warp Text menu allows you to create interesting effects with text, such as the fisheye lens effect, a flag, wave, arc, twist and many more. Photoshop 5.0 text

ating 3D type. One drawback is that text cannot be typed on a path. This means that it can't wrap text around a circle, line or predefined shape.

Photoshop is now also capable of drawing vector graphics — something that was promoted as a key feature of Adobe Illustrator. Colour fills and gradients can be added, as well as effects such as embossing and drop shadows, although gradient meshes haven't been included (these allow more sophisticated shading). It looks like Illustrator will be phased out eventually, as Photoshop keeps borrowing its features. Photoshop also works across platforms with other Adobe products such as GoLive, InDesign, LiveMotion, Premiere, After Effects and Acrobat. This allows files to be transferred into other applications easily.

Fun new tools include the liquify command, which distorts images by twirling, shrinking and bloating. You click a brush size and hold down the mouse button on your victim's eyes, nose and mouth to give them a new look. If all doesn't go quite to plan, you can reverse the process and watch as your image morphs back into its original form. There's

also an extract tool that is very useful for cutting out people, animals or objects with furry edges such as hair. Paint a line along the edge, fill in the inside with a tool,

and Photoshop does the rest. However, it isn't perfect, and did require some tweaking in our testing.

The layers palette has also been improved. You can group layers into sets to apply the same settings to several layers at one time. Adjustment layers and effects are also easier to access on the layers palette as you don't have to go through the top menubar. Layers can be preserved in TIF format, so the image doesn't have to be flattened when placing it in your layout application.

Image Ready 3.0 is also included with Photoshop. Animations, rollovers, mousedowns and so on can be created and then viewed in your browser, so you can see how images will appear on the Web.



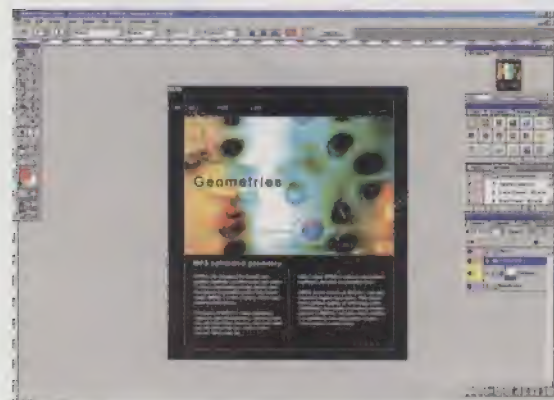
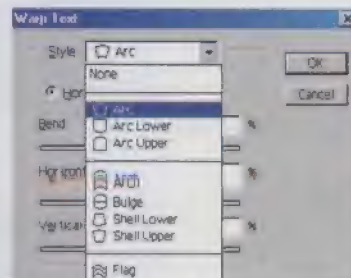
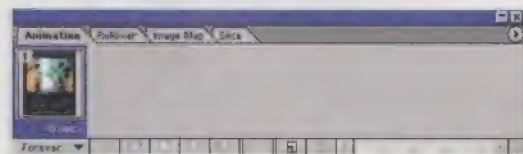
You can also preview colours and image quality as they will appear when outputted professionally to film or on your standard inkjet printer. Select your output device and paper style, and Photoshop will display the image onscreen so that the colours can be adjusted. Images can also be printed professionally, so registration, separation, emulsion up/down, negative and other details can be set and viewed in a preview menu. Placing an image in a layout application like QuarkXPress or InDesign is no longer necessary when outputting images to film.

A new annotate feature allows you to leave notes or even record voice prompts on documents. These messages can be instructions for colleagues, clients or students on particular features of the

image. For example, you can explain how you created a given layer or why a certain element is included.

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Craig Carroll



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Leadtek WinFast GeForce2 MX and ATI Radeon DDR

The Leadtek WinFast GeForce2 MX and the ATI Radeon represent two slightly different interpretations of current video chipset design. They're the first video cards aimed at the mainstream market to include T&L (transform and lighting) engines, and both compete in roughly the same performance class. APC took these two cards to the test bench to see how each fared.

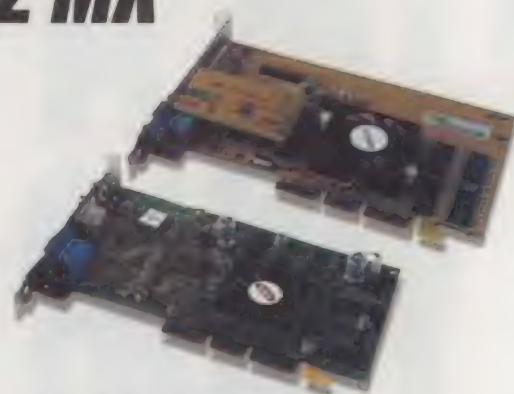
ATI hadn't made a serious attempt to compete in the high-end video graphics arena until recently, when it released the Rage Fury MAXX. This card sparked the curiosity of the gaming community with its unusual twin GPU architecture, but its performance wasn't competitive.

ATI has taken a more conventional approach with the design of the Radeon. Its chipset uses standard nVidia-style architecture — a single GPU and T&L (Transform

and Lighting) engine. However, it incorporates special features that improve memory performance. The 3D card review in July APC (see page 99) noted that high-end GPUs are starting to process data faster than memory can deliver it. The GeForce2 GTS overcomes this problem as it has faster memory and more of it.

ATI has adopted a more subtle solution to the problem. In addition to using DDR (double data rate) SDRAM on all Radeon-based cards, it's improved the efficiency of the T&L engine (the Charisma engine) to minimise the amount of memory bandwidth it absorbs.

The GeForce2 MX chipset is a cut-down version of the GeForce2 GTS chipset. Its price and performance level are appropriate for the mainstream gaming market. There are two main differences between these versions



of the GeForce2 chipset: the MX chipset's GPU is clocked at a lower speed and it has two pixel pipelines rather than four, and the MX version of the chipset can only manage about half the pixel fill rate of the GTS.

When APC took the Leadtek WinFast GeForce2 MX and the ATI Radeon DDR to the test bench we got some unusual results. As the Radeon has 64M of DDR SDRAM and a 200MHz GPU, and the GeForce2 MX only has a 175MHz GPU and 32M of SDRAM running at 166MHz, we expected the Radeon to do far better than the GeForce2 MX. Overall, the Radeon did return better results, but not markedly so, and not in every case. The tests that indicate performance in real world conditions let it down.

The Radeon performed poorly in many of the viewperf tests, suggesting that its support for OpenGL and T&L is weaker than that of the GeForce2 MX. The Radeon's performance was also significantly weaker in the TreeMark Transform and Lighting tests. However, as TreeMark was created by nVidia, it might not be a reliable measure of the capabilities of ATI's Charisma engine.

The Radeon's strength lies in its feature set. The card includes a hardware DVD decoder, composite video input and output, and S-Video output. Of these, the DVD decoder is probably the most outstanding feature in terms of value, as it substantially improves DVD playback (DVD playback software comes with the card).

The GeForce2 MX doesn't have the DVD decoder and has fewer features generally, but at \$349 it's much cheaper than the Radeon. The Radeon is expected to retail at \$749. The \$400 price gap is only partly justified by the Radeon's extra capabilities. The rest is just another reminder of how expensive DDR RAM is at the moment. In this instance, the added cost of including it isn't justified at the test bench.

The Leadtek WinFast GeForce2 MX chipset performed well in the tests, but these results don't apply to all GeForce2 MX cards.

Andrew Colley

Product	Leadtek WinFast GeForce2 MX	ATI Radeon DDR
Contact	Servex	BCN Technology
Phone	(02) 8762 3020	(02) 9648 0888
Online	www.leadtek.com.tw	www.bcn technology.com.au
Price	\$349	\$749
Warranty	2 years	3 years
Graphics processor	256-bit nVidia 2nd-generation GPU	ATI Radeon GPU

Specifications

Video memory/bandwidth	32M/128 bit	64M/128 bit
Video memory speed/type	166MHz/SDRAM	200MHz/DDR SDRAM
Graphics processor speed	175MHz	200MHz
RAMDAC	300MHz	300MHz
Output types	VGA, digital, composite video	RCA composite video in, RCA composite video out, VGA, S-Video out

Bundled software	WinFast DVD, Colorific, 3Deep, True Internet Color, Cult 3D	To be announced
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Benchmark results

3D Winbench2000	37.8	63.2
Business Graphics WinMark 99	182	174
High-End Graphics WinMark 99	508	459
3DMark2000	3,378	3591
Video2000: overall score	1,992	2402
Video2000: quality	774	1079
Video2000: performance	619	684
Video2000: features	599	639
Expendable lowest fps	25	24
Expendable average fps	44.4	39
Quake III: 1,024 by 768 at 16 bit	60	55.5
TreeMark simple/complex fps	14.9/41.8	7.84/30.5
viewperf: Advanced Visualiser	49.51	25.81
viewperf: DesignReview	18.95	9.926
viewperf: Data Explorer	26.59	15.2
viewperf: ProCDRS-02	11.89	22.29

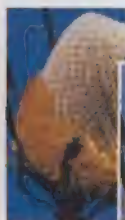
The products used in these tests are shipping versions available to the public at the time of publication, unless otherwise stated. Winstone, WinBench and associated programs are registered trademarks of Ziif-Davis Inc. These tests were performed without independent verification by Ziif-Davis, and Ziif-Davis makes no representations as to the results.

Full colour, superior economy. \$139.^{RRP}

BRILLIANT PHOTO COLOUR on plain paper, super operating economy, high speed blacks, PhotoRealism and automatic image improvement. You can't go wrong with the super value BJC-1000SP.

Brilliant plain paper photo quality automatically.

The BJC™-1000SP uses advanced colour definition routines for half-tones and areas of low colour density. A separate, selectable function called Photo Optimiser is included in the printer control software.



Before.



After.

It automatically adjusts for defects in exposure, highlights and shadows, and prints accordingly with standard inks designed to optimise quality on low-cost plain paper.

Reduced operating costs.

Using a special resolution matrix, the BJC-1000SP features a Super Economy mode that vastly improves operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.

High quality blacks at high speed.

The optional high capacity black ink cartridge uses 64 print nozzles for high print speeds. The selectable text smoothing mode goes up to 720 dpi to maximise text quality.



Optional BC-03 high capacity black ink cartridge.

PhotoRealism produces colours between colours.



PhotoRealism™ When superior photographic reproduction counts.

The optional PhotoRealism cartridge is ideal for high resolution paper, glossy photo paper and high gloss film.

Low-density inks vary colour saturation per dot to dramatically increase the colour combinations, reduce graininess and smooth tonal gradations.



Better Internet images.

Image Optimiser, a printer control software feature, can automatically "correct" low-resolution images up to the printer's maximum resolution.

Print banners up to 6 A4 pages long, envelopes, overhead transparencies, T-shirt transfers, and even choose an optional fluorescent ink cartridge for display effects.



BJC-1000SP
Just \$139.^{RRP}

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support.

For more information call 1800 021 167.



Canon

Palladine LCDpc

At first glance, the Palladine LCDpc looks like just another iMac clone, with its turquoise casing an all-in-one design. You could reasonably conclude that the Palladine LCDpc's appearance is an attempt to cash in on the iMac's enormous consumer appeal. That said, the

LCDpc shows a lot of promise and could be a sign of things to come in the PC market.



Product	Palladine LCDpc
Contact	Impact Systems Technology
Phone	(02) 9621 2999
Online	www.impactsystems.com.au
Price	\$3,699
Warranty	2 years on system/ 1 year on LCD screen

Specifications

Processor	Pentium III 733MHz
Secondary cache	256K
RAM and type	64M SDRAM
Hard disk	10G
Hard disk controller	IDE
Hard disk file system	FAT 32
Graphics card	N/A
Video bus type	AGP
Video RAM	8M SGRAM
Video controller chip	AOpen
Monitor	15in active matrix TFT
CD/DVD-ROM drive	DVD-ROM
Soundcard	Integrated creative sound
Modem	56K internal
OS available	Windows 98 SE
Software and accessories	Microsoft Works 2000

Benchmark results

Business Graphics WinMark 99	94.6
High-End Graphics WinMark 99	331.7
Business Disk WinMark 99	2,527
High-End Disk WinMark 99	7,710
CPUMark 99	61.4
FPU WinMark 99	3,520
3DMark2000	Unable to complete
viewperf Advanced Visualiser	5.021
viewperf DesignReview	2.129
viewperf Data Explorer	4.046
viewperf ProCDRS	Unable to complete
Quake III Arena 640 by 480 at 16 bit	Unable to complete
Quake III Arena 1,024 by 768 at 16 bit	Unable to complete
Quake III Arena 1,600 by 1,200 at 32 bit	Unable to complete
TreeMark simple (fps)	Unable to complete
TreeMark complex (fps)	Unable to complete
SYSmark2000	Unable to complete

The product used in these tests is a shipping version available to the public at the time of publication, unless otherwise stated. Winstone, WinBench and associated programs are registered trademarks of Ziff-Davis Inc. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations as to the results.

The LCDpc has an LCD active matrix TFT display. Usually an expensive alternative to the standard cathode ray tube (CRT) monitor, LCD technology is becoming more affordable for the desktop monitor market. Thanks to its wide use in notebook and handheld devices, prices have dropped considerably and, although they're still more expensive than a CRT display, a good quality LCD monitor is now within reach.

Reasons for opting for LCD over CRT are many and varied. CRT monitors are notoriously power-hungry, cumbersome and heavy. The high voltages and frequencies at work behind the screen pose a potential radiation risk and the quality of the display can be affected by electromagnetic interference from nearby sources, including other monitors. LCD screens eliminate these problems and take up far less space on the desktop.

The Palladine LCDpc has an all-in-one design which combines the conventional features of a PC and monitor into a single unit. This makes it a good choice wherever space is limited. The front panel features the 15in LCD monitor and two removable media drives. A 17in monitor is expected to be released in the near future. The unit APC reviewed featured a DVD drive with software decoder and a standard 3.5in floppy. Tucked behind the panel is a 10G IDE hard drive with 64M of SDRAM and a Pentium III 733MHz

processor. You can access the internal workings by simply unscrewing the coloured rear casing.

The LCDpc's components are all standard. This makes finding parts for upgrading a relatively easy process. In fact, upgrading is something you may want to consider immediately, as the AOpen 8M video card that is supplied will not perform 3D graphics tasks. Upgrading to the 3D graphics card of your choice is an option offered by the manufacturer.

It is a promising package. However, the overall performance of the unit fell short of expectations when put through APC Labs' testing.

When APC ran a suite of viewperf benchmarks (which run through scripts to evaluate the OpenGL performance of a system), the limitations of the video card became very clear. The PC scored poorly in the Advanced Visualiser, DesignReview and Data Explorer tests, and could not run the ProCDRS-02 benchmark at all.

In addition, the entire system showed occasional signs of instability. The most extreme example of this was when it became incapable of running the application-based SYSmark2000 suite of benchmarks.

When it was able to run a testing program, the LCDpc achieved average results. The unit's performance in business and high-end applications was adequate, but this probably won't worry the home users the system is aimed at.

The 733MHz processor enabled the LCDpc to score well in the Ziff-Davis CPUMark and FPU WinMark 99 tests, but the results were not enough to redeem the system. Its inability to perform specific benchmark tests was a concern, and these problems need to be sorted out before it can be recommended.

Once improved, the unit would be best suited to home users who don't perform high-powered or labour-intensive tasks regularly, but want a basic PC with striking looks. The price may put these buyers off, but the swish LCD monitor is well worth the cost.

Fiona Williams

Pros Smart LCD screen

All-in-one design saves space

All components are upgradable

Cons Signs of instability

Big printer performance.

Small printer price & economy. \$189^{RRP}

HIGH RESOLUTION COLOUR, high-speed blacks and superior operating economy with easy to use, broad flexibility for Windows and Mac. Plus optional PhotoRealism and scanner cartridge.



Exceptional results, easily.

The inks are optimised for plain paper with resolutions up to 720 x 360 dpi that can be automatically enhanced with Drop Modulation Technology.TM Variable drop sizes are placed in any of five "strike pattern" combinations to smooth colour gradations and improve tonal quality.



Reduced operating costs.

Super Economy mode uses a special resolution matrix to improve operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.¹



Better Internet images, special effects.

Image Optimiser can automatically "correct" low-resolution Internet images up to the printer's maximum resolution.

Turn photos into simulated illustrations and create sepia and mono hues, print banners up to 6 A4 pages long, envelopes, overheads and even T-shirt transfers.



Duplexing, high speed blacks. A new driver allows manual duplex on plain paper with standard inks.

For B&W only, an optional dedicated black ink cartridge with 128 print nozzles offers print speeds up to 5 pages per minute.²



Built-in parallel and USB interfaces for Windows and Mac.³

The optional scanner cartridge captures colour photos and text with resolutions up to 360 dpi.



Automatic Image Improvement, easily. Advanced colour routines help define half-tones and areas of low colour density. Photo Optimiser automatically adjusts for defects in exposure, highlights and shadows and prints accordingly.



BJCTM - 2100SP
Just \$189^{RRP}



Drop Modulation Technology.

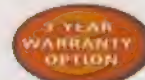
Smaller ink drops, about 1/3 the size, are automatically mixed with standard drops to enhance quality.



Layering variable ink densities in each pixel lets you print colours between colours.

5 times the photographic colour combinations.

Optional PhotoRealismTM inks vary the saturation so that a single dot could have 0%, 33%, 67% or 100% of a colour. This produces up to five times as many colour combinations as conventional CMYK inks for better half-tones and less grain.



Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

Canon

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C50808/2

Trek ThumbDrive

Removable storage is great, as long as you don't mind splashing out for drives on every system you're likely to use and then carrying them around. Trek's ThumbDrive is aimed at those who want to avoid both limitations.

The ThumbDrive is little more than a chunk of memory in a solid plastic case with a USB connector at one end. Despite its connector, this drive only runs on Windows 98.

Installation of the ThumbDrive was exceedingly easy, but the claim on the box that it needs 'no software' is rather deceptive, as drivers must be installed. Once that's done, it appears as a regular removable drive within Windows Explorer. Files can be copied to or from the drive, as well as permanently deleted. Drive scanning is done through a separate application supplied on floppy disk. Scanning deletes all data on the ThumbDrive. This is made very clear *before* scanning takes place.

Once installed, the only physical change you can make to the ThumbDrive (apart from unplugging it) is to lock it with a very small catch at the back. A small green light on the side of the unit is the

only indicator that the ThumbDrive is working. The light flashes when the drive is being accessed, and is permanently on the rest of the time.

APC tested the drive by transferring data between a desktop system and a notebook, and found it extremely useful and quick. However, there is one catch. The ThumbDrive unit is about the size of a packet of chewing gum. As such, it's wider than the normal USB connector, and if your USB ports are close together (as is normal for desktop machines), it can be a tight squeeze to get the ThumbDrive in. We managed (with some pushing), but we weren't happy that we'd had to force it into the port. This could also be a problem for notebooks with low USB ports.

The ThumbDrive comes in a variety of sizes, from 8M to 256M. The unit APC tested was 32M and file transfers were extremely fast. It took just over a minute and a half to fill the drive to capacity, but copying smaller individual files took a lot longer.

The ThumbDrive is reasonably priced,



and beats almost every other option for portable storage we've seen — as long as it fits onto your system.

Alex Kidman

Pros Quick set up
Good variety of storage sizes
Cons Bulky design

Contact AGA Technologies
Phone (08) 9301 5055
Online www.agate.com.au
Price \$279 for 32M version

Casio Wrist Audio Player

Miniaturisation of memory media, and the rise of MP3 music files, has seen a boom in mobile MP3 players in the past year. This is by far the smallest player APC has come across. The Casio Wrist Audio Player is a combined music player and watch.

The unit we reviewed is not the final version, and has smaller memory capacity and less functions, but it is a good indication of what is to come. The player will be available by the end of the year.

The player is similar in size to watches in the Casio G-Shock range, but it is bigger and chunkier when the MP3 headphone jack connector is plugged in. It features everything you'd expect in a digital watch — time, stop-watch functions, alarm — plus a calendar and daylight saving settings. The



LCD features dancing figures when playing MP3s, and these can be customised with any animation you design.

The player comes with a cradle that connects to your PC for downloading music and recharging the Lithium ion battery. The battery will allow you to play about four hours of continuous music. It stops playing tracks well before the battery is totally drained, so you always have accurate time. The software for loading music is uninspiring, and is little more than a file selection tool. Useful information on the MP3 selected is displayed, including encoding rates and AC3 details.

The player APC tested could handle MP3s recorded at 128Kbps at 44kHz. No deviation in quality (either higher or lower) was possible. We were unable to determine what encoding rates are supported, but as Casio lists the minutes of available music storage in high, medium and low-quality modes, variations

from the standard 128Kbps/44kHz format should be supported.

Musically, the Wrist Audio Player cannot be faulted. The audio is excellent and there is a powerful equaliser function. However, the headphone buds supplied with the player sound weak and tinny. When we plugged the watch into speakers or decent ear buds the sound quality improved markedly. The buttons for playing, stopping and skipping tracks are small and fiddly, but you do get used to them.

Darren Ellis

Pros Very portable
High-quality audio
A good watch and MP3 player combo
Cons Buttons are quite fiddly
Software is basic

Contact Calculator King
Phone (03) 9696 3366
Online www.calculatorking.com.au
Price \$499

I440dpi, separate transparent ink tanks with monitoring system. \$279^{RRP}

EXTRAORDINARY QUALITY, superior operating economy, high speed printing plus extra rich blacks, parallel & USB ports for Windows and Mac, optional PhotoRealism and scanner cartridge.

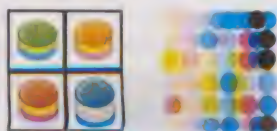
Advanced imaging performance.

Resolution goes up to 1440 x 720 dpi. Drop Modulation Technology™ adds variable ink drop sizes that are automatically used in any of five pattern combinations. Then, the printer control software uses colour definition routines more in line with perceptions of the human eye. The benefits are obvious. Sharply defined lines and text. Vivid, more natural looking colours. Subtlety in shaded and highlighted regions with smooth colour gradations.

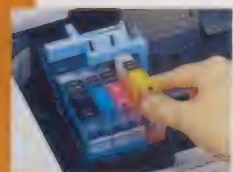


Colours between the colours with optional PhotoRealism.™

Low density inks vary the saturation level per dot (e.g. 33% or 67%) for up to five times as many colour combinations as conventional CMYK inks for smoother colour and tonal gradations with vastly reduced grain, even in areas of low colour density.



PhotoRealism produces colours between colours.



Transparent ink tanks, "smart monitoring system," superior operating economy.

Standard inks are optimised for plain paper. There are individual, transparent ink tanks for all colours, and each is separate from the print head.

A beam of light measures ink status through a prism moulded into the bottom of the tanks. This allows a printer driver monitor to report on ink levels, and alert you when an ink is running low. You replace only one colour at a time, and don't have to worry about running out of ink.



High speed printing for all colours, blacker blacks.

Using large print heads and bi-directional printing it prints up to four colour pages per minute. An optional, dedicated black ink tank and cartridge with 160 print nozzles is capable of B&W speeds up to 9 pages per minute.* And the black in both the standard and optional cartridge is an extra-rich black ink.



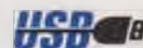
Automatic Image improvement, broad flexibility, optional scanning. Photo Optimiser adjusts for defects in exposure, highlights and shadows, and prints accordingly.

Image Optimiser can print low-resolution Internet images up to the printer's maximum resolution. Print banners up to 6 A4 pages long, envelopes, overhead transparencies and even T-shirt transfers. Turn your printer into a 720 dpi colour scanner with the optional scanner cartridge, pictured right.



BJC™ - 3000
Just \$279^{RRP}

Parallel and USB interface. Both ports are built-in for Windows and Macintosh.®



Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

Canon

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Sony MVC-CD1000

One of the problems with conventional digital cameras is that you have to spend quite a lot of money on the storage memory. You also have to spend time uploading images to your PC. This is a time-consuming process. The Sony MVC-CD1000 has an interesting solution to these problems: it writes all its images to CD-R.

The CD1000 is not as cheap as it could be. To keep the size of the unit as small as possible, the CD1000 records to 3in CDs, commonly known as CD singles. The format never really took off for audio CDs (but those discs that are released usually become collectors' items down the track) and it could be difficult to get hold of blank CDs to record to. Sony sells them for about \$8 each, but you might find a better price on the Web. A CD single holds about 160M when used in the CD1000.

Using CD-R as a digital camera medium has one drawback: it's impossible to delete files. The CD1000 claims to have the capability, but all it does is tell the CD not to write the 'deleted' track to the table of contents when finalising the disc. The space is still used up. This makes the CD1000 much closer to a regular film camera than a digital camera. Once a shot is used, there's no going back. Still, APC managed to get eight MPEGs and 100 shots onto a single CD, so a few redundant files weren't a problem. It still took a long time to fill up the disc.

Writing the image to the CD track is reasonably fast. There's about a two-second gap during which it isn't possible to take pictures. Images can be saved in a variety of formats, from simple 640 by 480 images to high-quality 1,600 by

1,200 files using the CD1000's 2.1 Megapixel CCD. The latter uses a lot of power. An onscreen display shows the remaining battery time in minutes (up to 100 minutes), and once you start saving images, the remaining time decreases rapidly.

CDs can be removed at any time and read from a regular CD-ROM drive. To do this you have to go through 'finalisation' — in other words, the camera drive has to write the table of contents to the CD. This gobbles up 13M of CD space, so it's worth keeping finalising to a minimum.

The CD1000 is also capable of MPEG movie capture in five-second fragments, but the quality isn't that great. It's just a gimmick.

The camera is so big that a number of APC staff members mistook it for a video camera. Controls are spread out all over the camera. The only problem APC encountered with the controls is that the switch that moves between browsing images, taking shots and recording movies, tends to slip a little between positions, and can be hard to place accurately. Other than this, controls are easy to find and quite intuitive.

The large physical size of the camera is partly due to the CD-R drive and large LCD screen. The rest of the bulk is made up of the mighty lens. Sony advertises that the CD1000 is capable of 20x zoom. This is digital zoom, not



actual zoom, so some interpolation is involved. Still, we were able to get some pretty good pictures of the street from our ninth-floor office. A shot taken across a suburban road was very clear and detailed. At the level of zoom required for this shot (and especially at highest possible zoom) the pictures get a little grainy, but the image stabilisation ensures the shot doesn't jump around too much.

Another important consideration with the CD1000 is the price. For just under \$3,000, you could buy yourself a standard digital camera and quite a bit of dedicated memory to go with it. However, the benefit of using CD media is that images can be transferred to your PC quite quickly. The camera also comes with USB cables for sending pictures to your PC without finalising the disc. A selection of image manipulation software also comes with the camera. None of it is exceptional, but it all works reasonably well.

Alex Kidman



Pros Easy to use

Images can be accessed with a CD-ROM drive

Cons Quite expensive

Heavy

Contact Sony

Phone 1800 226 429

Online www.sony.com.au

Price \$2,999

Super fast dual print heads, 1440 dpi, 6 ink colours. \$399^{RRP}

**ULTRA HIGH SPEED,
superior operating
economy, whisper quiet
and brilliant quality.
Plus optional 6-colour
PhotoRealism.**

Advanced print head system.

The compact body utilises a dual print head system designed to satisfy the needs of even the most demanding user. Speed, plain paper quality, extra rich blacks, individually replaceable transparent ink tanks plus optional 6 colour PhotoRealism and high definition colour scanning. The BJC™-6200 offers it all, in one of the quietest printers ever.



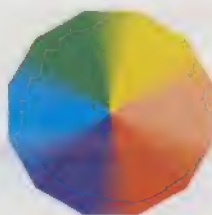
Superior plain paper print quality.

Standard inks are optimised for plain paper. Resolutions go up to 1440 x 720 dpi. Drop Modulation Technology™ automatically adds variable ink drop sizes and the printer control software defines colour more in line with perceptions of the human eye.



PhotoRealism™ with 6 ink colours for even more tonal gradation.

Optional low density PhotoRealism inks may be used simultaneously with standard density colour inks. The 6-colour system delivers life-like reproduction, especially on higher paper grades. Tonal gradations are smooth even in difficult to reproduce colours such as skin tones and light, glossy surfaces.



A smart ink monitoring system alerts users when a colour is running low. There are individual transparent ink tanks for all colours and each is separate from the print heads, significantly reducing operating costs and allowing you to replace only the empty tank.

An optional scanner cartridge delivers resolutions up to 720 dpi.



BJC-6200
Just \$399^{RRP}

USB

Built-in parallel and USB interfaces for Windows and Mac[®].

Higher speed, blacker black.

A high performance engine with bi-directional printing capable of up to 3 lines per pass results in monochrome text speeds up to 10 pages per minute and colour printing up to 7 pages per minute, making the BJC-6200 easily the fastest printer in its class. Plus the black cartridge employs pigment inks for a richer print density with greater water resistance.



Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

Canon

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Where it counts

Net rich, Net poor

Your Newswire article (APC September, page 17) on Telstra and ADSL is timely, and should stimulate debate on broadband services for *all* of Australia.

I am only 45km from the Melbourne CBD and cannot get ISDN, ADSL or cable. The rollout of ADSL is encouraging in one respect, but it seems extraordinary that it is largely concentrated in areas that already have Telstra and Optus cable services. Ultimately, Australia's uptake of broadband and its influence on our international competitiveness will be judged not only on where it is available, but also on whether it is affordable.

Large segments of the Australian population will never get either cable or ADSL. This leaves satellite. Here, those of us without cable or ADSL really suffer from Telstra's pricing policy. Telstra charges a staggering \$60.50 per month for a miserable 1G download limit — plus standard ISP and uplink phone line charges. By comparison, iHug has a satellite service of 1G per month for \$43.95, including the ISP.

This suggests we should forget Telstra and join up with iHug. Alas, as far as I can gather from Telstra, the 50% government rebate for installation of satellite services is available only if you connect through Telstra — and its cost means you lose the value of the rebate in only five months, and then pay double iHug's prices thereafter.

The broadband infrastructure strategy must be realigned to ensure proper,

affordable access for *all* Australians, and this means reasonable charges for satellite and rapid development of satellite uplinks for those without access to land-line services.

Ray McHenry
Internet

Above the law

I was rather dismayed by your article 'The Levitical law' in the September edition of APC (page 58).

Your article shows a great deal of insensitivity to both Jewish and Christian readers who, incidentally, make up a large part of the IT community.

Not only did your opening paragraph have nothing to do with the substance of your article and was therefore irrelevant, it also showed a lack of understanding of the historical context and purpose of the book of Leviticus. You have left me to draw only one conclusion: you wanted to have a shot at the Bible.

It seems to me that, in doing this, you have managed to put many readers offside.

Adrian de Bruyn
Internet

Ed note: I think Adrian is blowing the issue out of proportion. The brief reference to the book of Leviticus was a light-hearted introduction to a column. Nonetheless, APC can see how it might have offended the Jewish and Christian communities, and apologise to anyone who took it as a slur on their religion; it wasn't intended as such.

Coding bites

My anger was recently stirred by what I believe is the international cartel of DVD producers which have got together and zoned the world for their own economic ends. I was also informed that not only are zone 1 DVDs incapable of being played on zone 4 DVD players, but if you have a DVD player set to zone 0 (which accepts any zone's DVDs), and the DVD maker has inserted a particular coding, the DVD player freezes and is rendered inoperable. If this happens more than 10 times, the DVD player is rendered useless,



even if the manufacturer agrees to unfreeze the player.

As I understand the situation, the DVD makers have agreed to zone the world, ostensibly to protect the release of films, but more seriously, to protect the commercial interests of distributors and studios.

I emailed the ACCC about this and here is its reply:

Thank you for your email, received by this office on 7 August 2000, concerning the manufacturers of DVD players.

You are concerned that manufacturers of DVD players may have agreed to divide the international market into zones for the production of DVD players. This means that each zone can only use a DVD player configured for that area and the DVD materials must match the configuration of the DVD player. You state that a DVD configured for the US cannot be played on a DVD player configured for Australia.

Letter of the month

Want to win a copy of Microsoft Office 2000 Premium?

The most interesting letter sent in during the month of November will win its writer a free copy of the world's most popular personal productivity tools, including copies of Microsoft Office 2000, Visio 2000 Professional and Project 2000. The total value of these packages is \$3,102. The winner of this fantastic prize will be published in APC January.



Continued on page 44

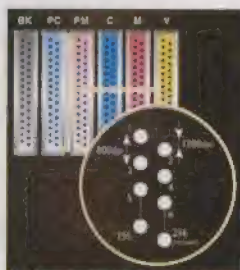
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Continued from page 42

By way of background, the Australian Competition and Consumer Commission is responsible for administering the Trade Practices Act 1974. The main purpose of the act is to promote competition and efficiency in markets within Australia, and to protect consumers from unlawful, anticompetitive and unfair market practices.

From the information you have provided, your complaint does not appear to raise implications under the act. However, if you are in a position to provide this office with further information in support of the allegations outlined below, this office would be in a better position to make a proper assessment of your complaint in terms of the act. This office would be interested in information supporting the following allegations:

1. That there is an agreement between manufacturers of DVD players to divide the international market into zones.
2. That manufacturers configure the DVD players so that they freeze or are rendered useless if a DVD from a different zone is used.

As you can see, they have got the issue slightly wrong — it is the marketers of the DVDs who are forcing the makers of DVD players to fall in line.

I think that something needs to be done, particularly since the ACCC has indicated it could take the situation further. With a bit of luck, this could result in greater freedom of access for Australians. The whole thing is absurd compared with video tapes, which are in precisely the same situation. However, NTSC tapes can be obtained within two weeks from the US (I do it frequently) and played on suitable video players and TV sets without any complications. And these tapes are of recently released movies not yet available in Australia.

Tony Young
Blackbutt, Qld

Ed note: Tony is justifiably upset about regional coding on DVDs. I don't like his chances of winning this particular fight, but it's a worthy cause. I'm not too sure about his claim that DVDs can 'render the player inoperable'. It sounds like an urban myth, but it is technically possible to configure players to work that way. Zone 0 players are easy to come by (many retailers will happily modify DVD players), but some DVDs are specially encoded so as to be unplayable on zone 0 players. A few models provide a switchable zone, which means they can play any movie. Tony is planning to reply to the ACCC with more details.

Alms for the techno-poor

Let me say how disappointed I was when I got home with my October 2000 copy of APC, only to find that the Borland software advertised on the front cover could only be accessed by those fortunate enough to have a DVD drive in their PCs. Bad move people!

Trying to buy the DVD-less off with some third-rate substitutes on the CDs doesn't help. If you have the space to fill up your CDs with D-grade games and marginal MP3s, then surely you can put major applications on there?

M Wilson
Internet

Ed note: A DVD's capacity is seven times that of a CD, so there was no way APC could put all of the software on both media. We decided to put all of the regular software on the CDs, while reserving special material for the DVD. We plan on rerunning some of the DVD software on future cover CDs.

Rejecting the dual

I recently came across a little problem with Microsoft's tech support team. It seems that Microsoft will not support dual-boot computers. I run SuSE Linux 6.4, and have never had any problem with dual booting.

The tech support agent said that "due to Microsoft policy, we can't help you with your current problem".

If this wasn't enough, the agent later told me that I could speak to a supervisor. Guess what? The supervisor didn't call back. In fact, I had to call the tech support line again and ask for the supervisor. The supervisor tried to understand my situation, but failed to be even remotely helpful.

I thought I'd try to talk about the competition between Windows and Linux, and why people have moved to dual-boot Windows and Linux. Once again, the supervisor said "due to Microsoft policy, we can't help you with your current problem".

The moral of this story: if you are running a dual-boot system, don't tell the Microsoft tech support people! They seem to think that with Linux onboard, your system is only half as good.

Name withheld
Internet

Ed note: I'm a little surprised. I would have expected the tech support answer to be 'uninstall Linux'. I wonder how Linux tech support organisations handle dual-boot configurations?

Extreme overclocking

Following your article on overclocking CPUs (APC August, page 126), I thought APC readers might be interested in seeing one of

the water cooling methods in action.

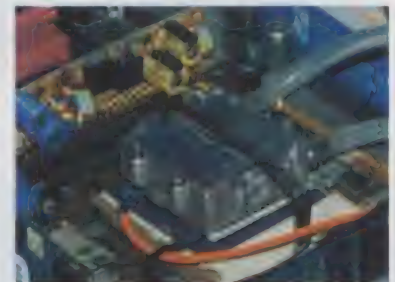
The photographs (right) were taken in Kuala Lumpur during a recent trip to South-East Asia, where overclocking seems to be all the rage.

This particular system uses a Peltier device in contact with the CPU, which is in turn water-cooled.

The CPU of choice is usually an AMD Athlon 700/750MHz, which is typically overclocked to 1GHz or beyond. The CPU shown was running at 1.06GHz. Interestingly, clocking this particular CPU at 1.05GHz made it unstable.

To achieve this level of control, most users also seem to use one of the Asus motherboards which allow clock adjustments in increments as fine as 1MHz.

Despite the large volume of water being circulated and the fan-forced radiator cooling, water temperatures can rise considerably, which reduces the cooling efficiency of the whole system. I heard of one chap who was running his AMD at 1.18GHz, and to extend the time between water replacements, he started each morning with large slabs of ice floating in a four-foot fish tank!



Considering Asian CPU prices are half to two-thirds those of Australian prices, it makes me wonder why spending hundreds of dollars on such elaborate cooling systems is necessary — why not just buy a fast CPU in the first place? But when you see how much joy these individuals obtain from their endeavours, I guess my question is answered.

Shane Arnfield
Internet

Ed note: I've long held that the joy of overclocking lies not in the marginal extra performance it provides, but in the sense of pleasure people get from defeating The System.

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I can't utter a single word without speculating on how it would sound with '.com' on the end.



Angus Kidman

Angus Kidman is editor-in-chief of APC and Newswire. He can be contacted at akidman@acptech.net. Angus' DisGust column is published Tuesday to Thursday every week at newswire.com.au.

Treating my domain addiction

Q uick, somebody stop me before I register again. There's no point in hiding it any longer. I'm addicted to domain names. What started out as a simple job requirement has become something of an obsession, and I'm not sure what to do about it.

While my job as Web editorial director for APC Tech does require me to check out and register domain names on a fairly regular basis, this has fairly defined limits.

Once you've started checking out whether schoolpc.com.au is available (not any more, kids), it's only a short step to wondering whether shortstep.com can be had. (No.) Or what about whatabout.com? (No.) Before you know it, every word in your conversation is having a .com added. This doesn't always make for smooth social intercourse (socialintercourse.com — no).

This is despite the fact that it's a dumb time to become a domain addict (domainaddict.com — no). It's universally acknowledged that most of the obvious English language domain names in the .com space are taken, leaving slim pickings (slimpickings.com — no). I think this has made me worse; knowing that any obvious domain name will be gone just stimulates me (stimulateme.com — no) to try to think of the exceptions, or clever new phrases that no one's tried out (such as clevernewphrases.com — still available when I wrote this). I'm not about to wimp out and go nuts for a .net or .org domain, but I do admit to getting sucked in when .tv was having a sale recently. And as for .com.au, how many fake businesses can you set up before ASIC starts sniffing around? (sniffingaround.com — yes!)

Of course, my addiction could be worse. Although I'm constantly speculating on useful domain names to register, I've only actually invested in a handful (and no, I'm not going to tell you what they are, but I did grab my own name fairly early on in the piece, and I finally got my personal site at gusworld.com.au set up). My credit card isn't damaged yet; it's my dignity that's under threat (underthreat.com — no).

I've only actually
invested in a handful
(and no, I'm not going to
tell you what they are).
My credit card isn't
damaged yet; it's my
dignity that's under
threat (underthreat
.com — no).

While general Internet addiction is now a recognised psychological problem, a cursory search of the literature (using, of course, a Web search engine) doesn't reveal too much about domain addiction. The typical Internet addict, according to one site I found when I could tear myself away from netsol.com and ina.com.au, has been using the Internet for less than a year, doesn't work and is most likely to be hooked on Net chat rooms. The majority are male, but most, unlike me, are over 40. I've

been using the Internet heavily since 1994, work far too much and haven't got time to use chat rooms because I'm too busy trying to think up new names to register (toregister.com — no).

Clearly, I need help, and uttering the words 'à la peanut butter sandwiches' (alapeanutbuttersandwiches.com — no) and hoping for a magic cure is not going to help. The obvious (and oh so noughties) solution would be to set up some sort of online support group, and share my experiences with other fellow sufferers, like the ever-growing number losing their domain names in WIPO decisions. There's just one small problem. I'll need to register a domain name for the support group first. ■

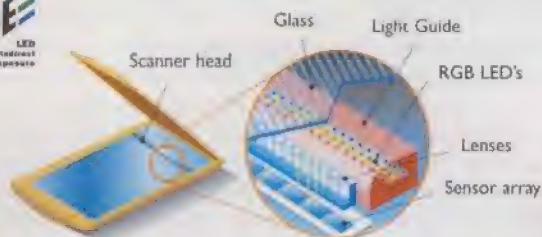
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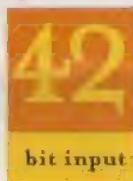
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*Do bigger and bigger chips mean the
end of Moore's Law?*

The chips are getting bigger



Jeremy Horey

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He can be contacted at
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We used to call them microprocessors, but maybe the chips on the drawing board at Intel at the moment need a new name. The new Pentium 4 chips will measure 217 square millimetres. The transistors are tinier than ever, all 42 million of them, but the chips are getting bigger and bigger — more like miniprocessors than microprocessors.

They are still nothing like the huge half-metre square CPUs of power mainframes, but these new Pentiums are a long way from the little silicon flakes the size of the top of your little finger that made up the first four generations of microprocessors.

However, with size comes cost. These big chips take up more space on the wafers, so each run in the fabrication plant produces fewer chips. Complex chips take more effort to design and debug. Only recently, Intel had to stop making its 1.13GHz Pentium III because, in some conditions, the chip produced faulty results.

Most of the cost of a chip is in its design. Once the chip is in production, the cost of making it is quite small. This has led to regular price cuts. As the design cost is recouped, the price of the processor is cut, making processing power cheaper.

This is why the twin catchcries of 'free bits' and 'free mips' have emerged. These refer to the theoretical end point of this steady decline in the cost of transmitting and processing information.

The Pentium 4 demonstrates that the cost of delivering more processing power is slowly increasing. Intel is doing its best to keep costs down, but we will never get 'free mips'. Moore's Law has held for 20 years. We have got twice as much processing power every 18 months since the late 1970s. At the same time, the cost of that processing power has stayed constant.

Over the last couple of years, the competition between Intel and rivals such as AMD have forced the pace, speeding up

the cycle so that the doubling in performance happens every 12 months.

In part, the increase in processor power comes from better-designed chips, but it also comes from running them at faster clock speeds. There are limitations on both sides.

The design of a new chip takes time. Not only must the millions of transistors be put in the right places, but the elements must also be tested virtually and then in real life on production chips. Making microprocessors run faster is much easier than designing a new chip, but each design has its limitations. There is a maximum speed for each design.

The Pentium III is at its maximum speed. The Pentium 4 has already been run at 2GHz. Intel will have even faster versions before the end of the line for the new chip.

Do we need ever faster microprocessors? For most of us running ordinary

desktop applications, there is no need for more and more speed. Exotic processors running at 1GHz don't make a lot of difference to how fast today's Microsoft Word or Excel run. These applications spend most of their lives on my machine waiting for my input or for files to arrive from the Internet.

In fact, for most of us, the 'free bits' sentiment is more interesting. Bandwidth is much more of a limitation for most computer users today. Both business and home users want faster Internet connectivity. We want more bandwidth to access public Web sites and extranets. We want more bandwidth to interact with content-heavy knowledge management applications, or with corporate intranets.

The miniprocessors risk making themselves as irrelevant to mainstream computing as the minicomputers that servers have replaced. The development efforts invested in putting more performance into the processor are diverting attention away from efforts to increase bandwidth. ■

**The chips are getting
bigger, more like
miniprocessors than
microprocessors.**

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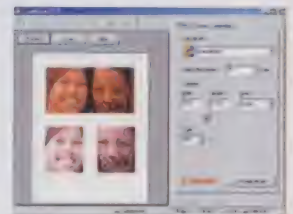
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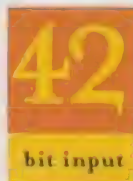
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*Lawyers need to promote corporate awareness
of legal IT issues more actively.*



Leif Gamertsfelder

Leif Gamertsfelder is a member of Deacons' digital industries group and specialises in Internet-related legal issues. He can be contacted at leif.gamertsfelder@deaconsllaw.com.au.

This article is intended to provide a general summary only and should not be regarded as a substitute for legal advice.

Lawyers responsible for poor esecurity

Many corporations are paying nothing more than lip service to esecurity. However, courts will not necessarily be lenient just because a solution is elusive. They will see the esecurity burden as a reasonable price to pay for the benefits that the Internet provides.

However, inaction in this area is not entirely the private sector's fault. It is largely a result of the legal profession's inability to communicate the legal risks associated with poor esecurity.

Very few corporations, directors or CEOs understand that they may be sued for a breach of esecurity in the case of hacking. Many see the legal liability falling squarely on the shoulders of the hacker. Nothing could be further from the truth. Any hacking incident raises the possibility of a corporation or its leaders being sued for a breach of corporations law, negligence laws, privacy laws (in jurisdictions where they exist), contract law or trade practices law.

Lawyers need to communicate this message effectively. However, even if this fact is widely appreciated, it's possible that a plaintiff wouldn't bother to try to determine liability issues, as they are seen as being too difficult. This is a false impression.

Generally, determining liability is relatively straightforward. With the assistance of expert witnesses, a court would analyse the method a hacker used to exploit a vulnerability and assess whether it would have been successful if the corporation had followed prevailing industry standards (such as AS/NZS 4444 or Gatekeeper) in designing and implementing its esecurity architecture. Obviously, expert opinion is vital in identifying relevant legal standards in this area.

Experts such as Rob McMillan, senior security analyst at AusCERT, suggest that corporations adopt the 'four pillars' approach to esecurity if they want to minimise risk in this area. The four pillars are:

designing and implementing effective user education programs; policies and procedures; software and hardware; and implementations and configurations.

However, if corporations are serious about esecurity and limiting legal risk in this area, they must conduct appropriate audits of their information systems against prevailing industry standards. They must also implement a good security policy with strong authentication procedures. The importance of experts signing off on all major security initiatives is essential. Their opinions will carry a lot of weight in any legal proceedings where it is alleged that a corporation has not upheld its legal obligation to maintain secure systems.

Besides educating corporate clients about the legal risks associated with poor esecurity, lawyers must ensure that corporate clients educate their employees about the legal risks inherent in downloading and executing email attachments from unknown parties that are patently not

work related. Lawyers must ensure that employees realise that they may be dismissed for a breach of a policy on technology use. These are not IT issues. They are legal issues, and lawyers must take the blame for not playing an active enough role in promoting awareness of them.

Why have the courtroom gladiators failed to perform? Frankly, despite all the legal puffery, lawyers have been slow to recognise their professional obligations in this area. A primary reason is that lawyers are unable to abandon their traditional mindsets.

Despite the rhetoric, ecommerce lawyers still see themselves as distant advisors. They don't tend to get their hands dirty. However, in the IT business, lawyers must integrate into the client's project team. They must be in a position to identify and deal with esecurity legal risks at a very early stage. It should be a routine part of their jobs. ■

**Inaction in this area
is not entirely the
private sector's fault.**

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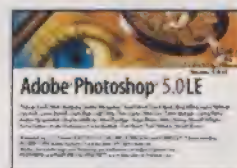
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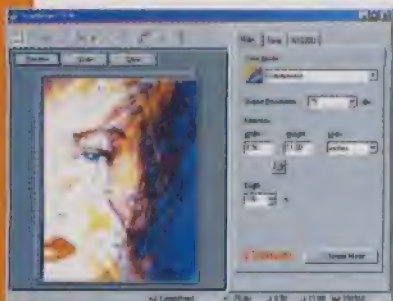
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The full version of Windows 2000 Professional is expensive, but there are options.

Professional upgrades

After almost a decade of stability problems with Microsoft Windows, Windows 2000 Professional promises to cut down the wear and tear on your restart button. However, the price of this premium operating system varies, depending on which operating system you currently own.

Most of the retailers APC spoke to are selling Windows 2000 Professional at or slightly above Microsoft's recommended retail price for a single-user licence. If you already own Windows NT 3.51 or 4.0, the Windows 2000 Professional upgrade will cost you about \$240, but if you're upgrading from Windows 98, you'll pay about \$360. For those who

don't own a Microsoft operating system already, the full version costs over \$500. At these prices, few people will even consider buying the full version for their home system.

Some consumers have found a legally ambiguous way to get a substantial discount on Windows 2000 Professional when buying hardware. Many hardware retailers will sell you an OEM copy of Windows 2000 Professional for about half the cost of a full version if you purchase it with a major system component, such as a hard drive, motherboard or CPU. This is possible because the retailers stretch OEM licensing agreements and treat major system components as complete systems. APC does not recommend you take this particular approach.

Windows 2000 was never really meant to be the successor to Windows 98. Windows 2000 Professional can perform as a basic server, which makes it suitable for organisations that need reliable server and desktop software with an accessible user interface.

It would make bad business sense for Microsoft to provide software with functions equivalent to its server products at a price that competes with its desktop software, in this case the recently released Windows Me. The full version of Windows Me costs about \$340, but if you upgrade from Windows 98, it will cost you about \$109. The enormous saving to

About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions.



be made by upgrading from Windows 98 is baffling, considering that it's essentially a fix pack with a few extra features. You're not required to provide the retailer with evidence that you own Windows 98; proof of purchase is handled by the Windows Me installation routines.



Retailer	Contact	Operating system	Licence	Price
Corporate Software	(02) 9725 3700 www.corpsoft.com.au	Windows 2000 Professional	Windows NT upgrade	\$240
			Windows 95/98 upgrade	\$359
			Full version	\$509
Forté	1300 368 923 www.fortecomputers.com.au	Windows 2000 Professional	OEM version	\$262
Harris Technology	1300 139 999 www.ht.com.au	Windows 2000 Professional	Windows NT upgrade	\$242
			Windows 95/98 upgrade	\$356.40
			Full version	\$509.30
Rite Price Computers	(03) 5672 4887 www.ompac.net.au/~rpc	Windows 2000 Professional	OEM version	\$274
Software Australia	(03) 9663 9111 www.mailordersoftware.com.au	Windows 2000 Professional	Windows NT upgrade	\$255
			Windows 95/98 upgrade	\$365
			Full version	\$525

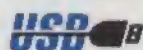
Combined print and film scanner with USB, surprisingly low \$299.^{RRP}

**BUILT-IN FILM SCANNING up to
1200 x 1200 dpi plus high quality photo
scanning in an easy to use scanner.**



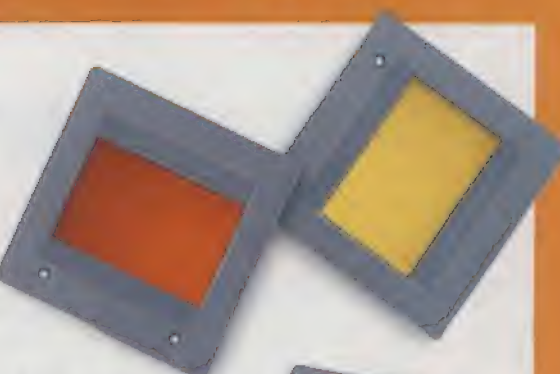
Easy to use print and film scanner with USB.

The CanoScan™ D660U solves diverse scanning needs simply. No adapters or add-on kits. Everything is built-in, and is available with the push of a button, one for photos, and one for 35 mm positive or negative film in either slide or roll format. For beginner controls, ScanGear Toolbox lets you select functions and the final destination of your scan such as printer, e-mail program, fax, copy or others.¹ Or, direct driver control lets you adjust scan size, resolution, and other parameters.² The USB interface connects to either Windows 98/2000 or Mac OS systems.³

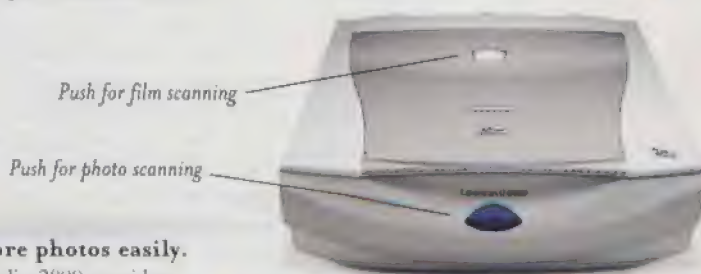
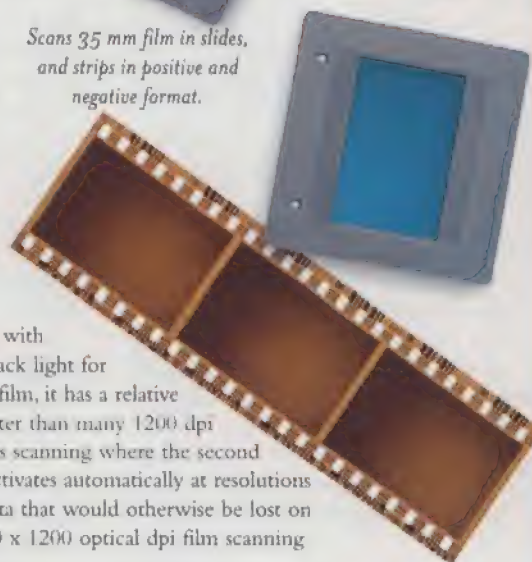


Superior 35 mm film scanning with VAROS.™

Continuous tone colours in film pose challenges. Canon solves them with innovative VAROS technology. The scanner cover includes a built-in back light for film that reaches an extra large CCD sensor. Much like high-speed film, it has a relative light sensitivity up to 4 times greater than many 1200 dpi CCDs. Then VAROS uses two-pass scanning where the second pass is refracted by half a pixel. It activates automatically at resolutions greater than 600 dpi, capturing data that would otherwise be lost on a lesser scanner. The result is 1200 x 1200 optical dpi film scanning in less space and lower cost.



Scans 35 mm film in slides,
and strips in positive and
negative format.



Edit and store photos easily.

ArcSoft PhotoStudio 2000 provides tools for editing photos, and ArcSoft PhotoBase creates an electronic photo database. Also included are Caere OmniPage Pro for OCR⁴ (optical character recognition), plus Adobe Acrobat Reader and PDF manuals for Windows and Mac.

CanoScan D660U
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Your Letters

Write to Your Letters and tell us about your shopping experiences. Whether you want to vent frustration or relate a positive encounter, this is your opportunity to share it with other APC readers. The contact details are on the opposite page.

If your complaint letter is published, let us know how your complaint progresses. We'll publish updates on as many of these letters as possible.



Dear APC,

I am very disappointed with the customer service at uBid.com.au, and right now I am concerned that they have some kind of financial problem.

I paid a substantial amount of money for a product I had successfully won the bid for. Now, after 11 weeks, I still do not have it in my hands. In May, I won the bid on a notebook. My credit card was charged soon after and I received an email saying my purchase would be leaving the warehouse shortly.

After four weeks, I contacted uBid to find out what was happening. The reply was "we are experiencing a delay in fulfilling all orders". I am still trying to find out what has happened to my product, or even my money, but no luck so far.

Yuhaw Lim
Internet



Dear APC,

I recently emailed Adelong Computers to make a claim under warranty for a defective Mitsubishi Diamond Data 50x CD-ROM drive.

Adelong failed to reply after a week, so I emailed them again. I then got a reply of sorts, enquiring whether I had telephoned "head office" for a return authority number. A quick perusal of the back page of their monthly catalogue shows that sales, warranty and general enquiries are available by phone or email. I emailed them again a week ago seeking a return authority number, and yes, yet again they have failed to reply. This is pathetic.

I am now wondering just how long it will take to have the item replaced or repaired, if they can't even organise a return to an email within two weeks.

Chris Walker
Givelda via Bundaberg, Qld

Broken promises and a broken lamp. This reader's experience with a telco has been one problem after another. By Roulla Yiacoumi

Comedy of errors

Why is it that so many people consider telcos to be a law unto themselves? It wasn't so long ago that Telstra (then Telecom) had the telecommunications market all to itself, particularly in local, long-distance and mobile phone calls. Back then, love 'em or hate 'em, there were no alternatives.

With competition came better pricing, more comprehensive services, and most importantly, choice. Aside from Telstra, we now have Optus, Vodafone, Primus, and AAPT, to name a few.

Is it a case of better the devil you know? One reader, Chris Freeman, wrote to APC to relate his experience with Optus. Many people would have seen the ads telling us that Rhonda and Steve are going back to Telstra. Perhaps Chris will be next.

Dear APC,

I would like to tell you about my experience in dealing with Optus.

In May, I called Optus to sign up for Optus local calls and pay TV. I was informed of all the costs and an installation date was organised.

I then spoke to a separate representative about the Optus@Home cable Internet service. I asked him if the service was available in my area and was told that yes, it was no problem. The cost, as well as the terms and conditions, were explained to me and I was given a username. The representative also told me about its customer satisfaction guarantee and said that if there were any problems, I would be entitled to some sort of "compensation".

I organised a date and time with Optus and arranged for my sister to take the day off from work to attend the installation. I was told the Optus technicians would be at the house between 7am and 12pm. I then phoned Foxtel to disconnect my service with it, including my two Internet accounts.

At 12.15pm, my sister called me to say no-one had arrived. I telephoned Optus and was told the installation would not go ahead because Optus cable Internet service was not available in my area. I was absolutely fuming as I has already cancelled my other Internet

accounts and it would cost me \$60 to have them reconnected.

A friendly representative told me she was really sorry and that the sales representative had misinformed me. She said she would immediately get the technicians to come out and see what they could do.

The technicians arrived an hour later. While they were installing the telephone line in my sister's room, one of them knocked over a \$60 lamp and broke it. The technician apologised and carried on with his work. My sister called me again. I telephoned Optus, and after finally speaking to a supervisor, was given an address to send a complaint to.

A week later, I discovered my Optus local call telephony service was not working. I thought the council may have been at fault, as they had been cutting leaves and trees that afternoon outside the property and perhaps they'd accidentally cut something. Being too busy, and sick and tired of calling Optus with complaints, I waited until Saturday morning to call. I was told that the telephone service had been disconnected and that it may have been a computer glitch. The representative organised for it to be fixed right away and it was up and running in about 10 minutes.

I have not received any phone calls from a customer service manager even though I was told several times I would get a phone call back.

Optus has simply wasted my time and caused immense inconvenience.

Chris Freeman
Cartwright, NSW

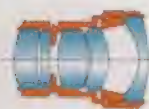
Chris later sent the following update to APC.

In late June, Optus sent a team leader out to inspect my property. After a number of stuff-ups, a supervisor came around and we showed him the broken lamp. He said thanks and left, saying he would make sure everything went through the right channels.

The technician whose name was on the service form later phoned me to explain that it wasn't he who had completed the installation — it was his

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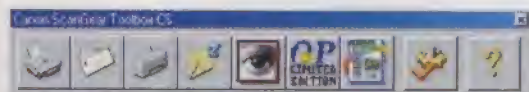
ADVANCED CCD, 1200 x 2400 optical dpi, fast Galileo Lens, full 42-bit colour and optional high intensity film adaptor unit.



Galileo
Aspherical lens.

High-speed Galileo Lens, advanced CCD, more optically accurate.

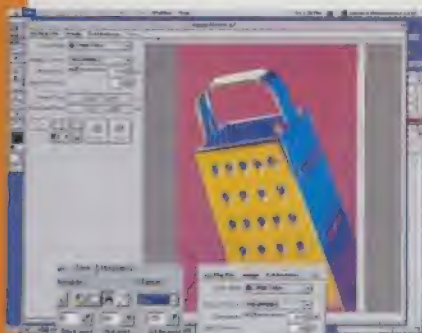
Superior performance begins with Canon's optical expertise. The five-element, aspherical lens system eliminates distortion. A shortened optical path and wide aperture lens (f-stop=5.5) increase scanning speed and improve signal to noise for a more optically accurate system. A true 1200 dpi CCD sensor is capable of finer detail and more accurate colour than "hit or miss" interleaved CCD approaches used by some competitors.



ScanGear Toolbox CS offers
"point and click" simplicity.

So advanced, so simple.

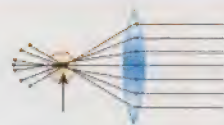
The easy to use unit delivers studio quality 1200 x 2400 dpi optical resolution for almost the same price as many 600 dpi scanners. The USB interface connects to Windows 98/2000 and Mac OS systems.¹



Full 42-bit colour.

True 42-bit input and output increases subtle tonal variation and colour accuracy. Photoshop 5.0LE, one of the few

applications capable of handling 42-bit colour, is included. Advanced controls cover gamma settings, histogram adjustment, colour curves and more.



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a single point.

Optional FAU-SII film adaptor, \$199.^{RRP}

High intensity film adaptor.

The optional film-scanning unit replaces the standard cover for reflective and film scanning, and matches or exceeds the performance of expensive moving light source designs. The light source in the cover uses dual sheets of 3M™ BEF film (Brightness Enhancement Film) plus dual, high-intensity cold cathode fluorescent lamps for maximum brightness. It accepts colour negatives and positives in 35 mm, 2 1/4" and 5 x 4" sizes.

Full software suite.

ScanGear control software, a universal TWAIN driver and Photoshop LE are included for Windows and Mac. Caere OmniPage LE for OCR is included for Windows. Caere PageKeeper for Windows and Caere ImageAXS for Macintosh create and access visual data bases.



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The one-year warranty is upgradeable to three years or a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



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Your Letters



Dear APC,
Finally, the ISP

that I've been waiting for is here! dingo blue is (in my opinion) the best ISP for university students like myself. At only \$25 a month for unlimited access and unlimited downloads, it's pretty good.

Now it may not be as good as all those extremely fast/high priced ISPs, but hey, I've been online for 12 days, downloaded well over 3G of stuff, without even a minor hiccup. Well done to dingo blue.

Mark Lancaster
Perth, WA



Dear APC,

Recently, I had technical problems with my ABC modem. I returned it to Harvey Norman at Penrith and was told it had to be sent to Melbourne for service. Luckily it was still under warranty. However, it would take three weeks to be fixed.

Now, what was I going to do without a modem for three weeks, especially as I was enrolled in an online course? The manager loaned me a brand new USB modem until mine was fixed. I'd like to say a public thank you to the team at Harvey Norman.

Loreta Kocovska
Internet

Update

• In APC September (see page 66), we brought you the story of Anne Daglish of Victoria who purchased a troublesome computer from Dick Smith Electronics. The company offered to exchange the dud with another machine. Anne recently wrote to Service & Reliability. "The computer I received from Dick Smith is excellent and, to date, only has one problem, which I have been told is quite common with this computer. It does not reboot properly, but freezes halfway through the process. In all other respects, I am very pleased with the replacement. I would like to thank APC for helping me."



Illustration by Christopher Neilson

brother and his father, who are subcontracted to him, which at least explains why an Austel licence number was not on the form. How does Optus allow this?

The technician later dropped by to apologise and offered a cheque for \$60 to cover the cost of the lamp. Optus later credited my account for the amount of \$11.65.

APC forwarded the original complaint letter to Optus on June 22, requesting a written response within seven days. Two months later, Optus provided an explanation.

Dear APC,

We certainly understand the frustration Mr Freeman has been caused by this series of events.

This issue has been resolved personally with Mr Freeman. However, we are happy to provide an explanation of why these incidents occurred:

1. Mr Freeman was incorrectly sold Optus@Home prior to the service being available in his area. Unfortunately, while this was picked up in our quality assurance process, it was not communicated to Mr Freeman in time. While Mr Freeman had also subscribed to our cable TV and local area telephony services, there are instances where one contractor manages the installation of all three services. In this instance, a mistake occurred on the part of the contracting company Optus uses in that they cancelled the installation altogether based on the fact that the Optus@Home service was not yet available at Mr Freeman's house. As a result, the installers did not turn up at Mr Freeman's house at the allocated time.
2. Our local area telephony customer service guarantee states that if a telephone

installation falls outside of the allocated time, the customer is entitled to compensation, and we have credited Mr Freeman's account with the relevant amount of money.

3. In relation to the lamp that was accidentally broken during the installation process, Mr Freeman was personally handed a cheque of equal value by the staff member who had allegedly caused the accident. This staff member, who is a member of a contracting company working for Optus, personally apologised to Mr Freeman for the damage caused.

4. We have also apologised to Mr Freeman for a systems anomaly which caused his telephone access to be temporarily interrupted. Optus ensured his access was up and running on the same day.

We would like to assure Mr Freeman, once again, that the series of incidents that he experienced are not a normal occurrence, and that Optus prides itself on providing a high level of service to its customers.

Optus Management

Chris has referred this matter to the Telecommunications Industry Ombudsman (TIO). APC will update you on the progress of his complaint.

What do you think of the way Optus conducted its business with Chris Freeman? Do you believe Optus suitably compensated him? Tell us about your experiences, good or bad, in dealing with any of the telcos. Write to me at ry@acptech.net or APC Service & Reliability, PO Box 4060, Sydney NSW 1020. Letters may be edited for length or clarity. We regret that all letters cannot be personally answered.

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Scientists are now building robots designed by a computer program that simulates evolution.

Unnatural selection

This experiment in robotics and evolution will be familiar by the time you read this — it was a front-page oddity for a day in September and video footage of shambling robots was played on the TV news — but the experiment is worth a more in-depth look. The strange designs that the program came up with are fascinating, as is the process by which they were selected.

The research was run by Hod Lipson and Jordan Pollack in the Computer Science Department, Volen Center for Complex Systems, Brandeis University. A

determine the 'fitness' of the current design. The fitter the design, the greater the chances of that model having 'children' based on its design.

According to Lipson and Pollack, many separate generations were born and died out. Their graphs show entire populations suddenly dwindling and dying, and other, weaker-looking generations struggling on to provide a mobile design. The main difference between this experiment and other simulated evolutionary engineering is that the final robot designs have actually been built.

The fact that the program used designs that were unusual is encouraging. The researchers cited a common example of the need to think beyond existing natural models in the field of robotics engineering: the wing of a plane. While it's modelled on a bird, planes do not use a flapping motion to achieve elevation. One outcome that Lipson and Pollack did not expect was the symmetry of many of the designs.

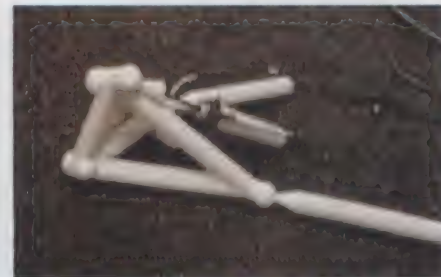
These machines are not reactive to the environment, because no sensors of any kind were included in the original



▲ Figure 1: The 'leg' helps to swing the rigid body forward like a person using a crutch, as the actuator swings the hinge forward.



▲ Figure 2: The tail of this design is pulled towards the body after the arms push it forward. This design looks oddly biological.



▲ Figure 3: Using a rod to simply push the body along in steps, this design has superfluous appendages — remnants of an earlier generation.

program called GOLEM (Genetically Organised Lifelike Electro Mechanics) was used, which is available from www.demo.cs.brandeis.edu/golem. The program was given the task of creating designs that were capable of locomotion on a flat surface, but these designs had to evolve over many thousands of generations, from digital primordial soup into real robots.

Imitating first life on Earth, the software was given extremely basic building blocks to begin with, including neurons (for control), bars (for basic, rigid framework), ball-joints and linear actuators. In conjunction with neurons, linear actuators control the length of a bar in much the same way that a neuron tells a muscle to expand or contract. Simulated within GOLEM, the machines could grow and form by merging designs or by adapting current designs by adding, changing or deleting one aspect of the design. Simulated movement on a plane (which was not frictionless) was used to

Using commercially available rapid prototyping technology, the scientists were able to construct the design in the real world. Slight changes in the size of the parts were necessary, as the motors and electronics had to be placed within the bars, and the actuating rods look more like miniature pistons than telescoping rods, but the prototypes worked almost exactly as the virtual designs did.

So what did the designs look like? Lipson and Pollack manufactured samples of three of the designs, which were fully mobile once running. The designs ranged from a triangular shape that used a combination of forward propulsion and a pivot (see figure 1), a fish-like design that used a combination of body retraction in counter-sync with two arm actuators (figure 2) and a design that made use of an actuator arm against the floor to ratchet the robot along (figure 3).

Aside from the fish-like design, most of the robots are unlike anything alive on earth. This is not such a bad thing.

design process, but once these limitations are overcome it will be interesting to see what kinds of designs the program comes up with.

There are few applications at the moment, but the implications are huge. For instance, if you took something with the complexity of Sony's AIBO dog, and broke its actions and motives down into parameters, the program might create something very interesting indeed. The parameters would be something along the lines of a four-legged robot with independent locomotion of each leg, a head with sensors and the ability to work all four legs in concert to provide locomotion in one direction.

It would take many virtual generations before even the most rudimentary designs were made, possibly millions of generations. However, in silicon life the time scale is nothing like the real world, so this could be realised within months. We'll wait and see.

Darren Ellis



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BANDWIDTH BOOM!

*Finally lightning-fast Net speeds are affordable and accessible. **Darren Ellis** and **Nathan Taylor** take a look at some of the new services on offer, and show you why it might be time to hook up.*

When Optus launched its cable Internet service in December last year, it was a big day for Australian Internet users. After five years of dithering, it finally provided some competition for Telstra's near-monopoly on broadband. And what a difference it has made. Prices for all data services are at their lowest ever in Australia. Consumers can now get all-you-can-eat packages at rates little higher than the overall cost of a dial-up connection (despite a disturbing move towards usage limits by Optus and Telstra).

Availability of these high-speed Internet access services is still very limited, but it is slowly increasing. People in major cities are still served best by cable and ADSL, but satellite services are more readily available to the rest of the country. Unfortunately, the cost of the latter is also governed by competition. As a result, it's often cheaper to get satellite in the cities than in rural areas.

In this overview of broadband services, APC has tested representative examples of each of the main services available in

Australia: ADSL (asymmetric digital subscriber line), satellite and cable. We've also provided a list of the main players in Australia, along with points to consider when choosing a broadband provider.

Your choices

While few people have the luxury of choosing between all the different options, many will be faced with some kind of a choice; for instance, between ADSL and cable. Each of the options work in a totally different way and have different advantages and disadvantages.

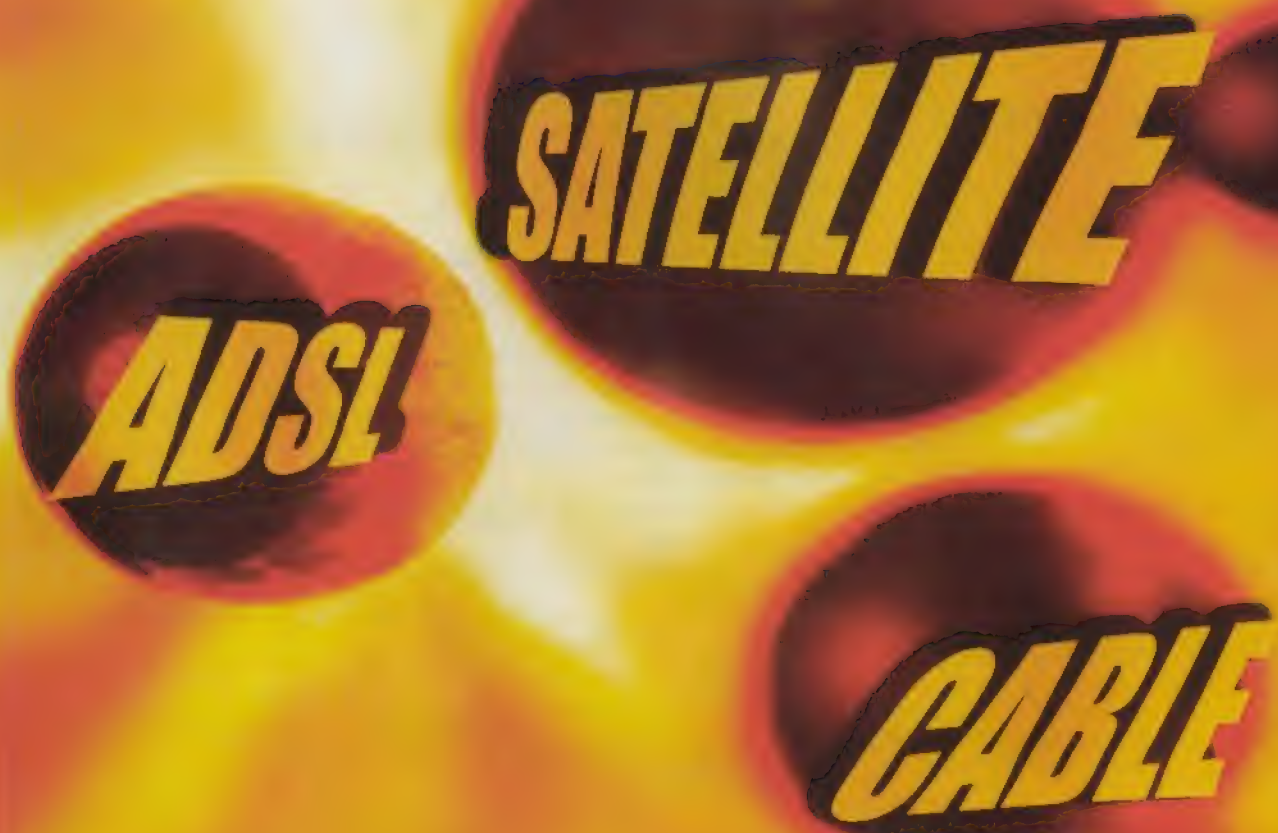
ADSL runs through a copper telephone line, and can be connected without affecting the plain old telephone service (POTS) on the same line. The service splits the line into two — one analog, the other digital. The analog line, for POTS use, works at a low frequency, and the digital works at a higher frequency. The signals are split by the ADSL modem.

The signal splitter can be active or passive. The main difference between the two is that if the power fails on an ADSL

modem with an active POTS splitter, access to the telephone line can be lost, but a passive POTS splitter always allows telephone access. Most current ADSL modems are passive.

Not everyone is eligible for ADSL yet, as you have to be within 3.5km of a telephone exchange that Telstra has fitted out with special equipment. To see if your house or workplace is eligible for ADSL, enter your phone number in the box on telstra.com.au/adsl/ordering/search.cfm. Regardless of which provider you intend to use, this will let you know if your area is ready for ADSL or if it is going to be rolled out soon.

Cable is probably the best-established broadband option for local users. Both Optus and Telstra offer cable modem connections in the Australian metropolitan areas. This service is delivered through Foxtel and Optus Vision cabling, so if you have pay TV in your area, you can usually get cable Internet as well, but there are some restrictions for people who live in units. APC tested both Optus and Telstra connections.



To access cable, you generally need a specialised modem (from your service provider) and an Ethernet card in your system. Like ADSL, the connection is split for different data types, so it's possible to surf the Net, watch pay television and (if you're an Optus subscriber) make local phone calls, all on the same connection.

Satellite Internet access is more complicated, and requires a satellite dish that works with a modem. Typically the satellite dish is around 65cm in diameter and needs to be mounted with a clear line of sight to the satellite. Cabling from the dish to the PC can run up to 30m without losing signal strength or requiring a signal booster (which is not usually included in the installation packages). The cable is usually coaxial, and connects to a satellite PCI card (similar to a modem) in your PC.

Running an uplink to a satellite requires a transmitter, which is prohibitively expensive, so all outgoing data travels through an analog modem connection. Satellite works well for general surfing and file downloads because the upstream

connection is mainly used for link requests and other low bandwidth uses.

The 400K satellite download speed is not as fast as cable or some ADSL connections, and the routing of data out through a modem, across the Internet, then up to the satellite and back to your PC can cause lag, so it's no good for games. However, some satellite services are cheaper than the other connection types.

Advantages of broadband

An obvious advantage of broadband is that it provides very high speeds. Once you've experienced these speeds, you can never go back. They're not just streaming speeds, either. Cable and ADSL services provide very low latency connections, making them ideal for gaming and video streaming.

Satellite services usually have a higher latency than analog modems, because the signal has to go all the way to a satellite and back again. As more subscribers have joined the major services, both the throughput and latency have worsened.

Most people focus on speed when discussing broadband, but perhaps the biggest advantage cable and ADSL plans offer is permanent connection. It's extremely convenient to be able to flip to a Web site or check email with having to go through the modem dialup and login process. Satellite and ISDN services don't offer this, unless you want to pay for the privilege.

Due to server and congestion problems, broadband services rarely provide full bandwidth, but if you're a serious downloader, you can get the best out of your connection by getting a large download going, and leaving it until it finishes.

Broadband speeds and tips

One of the main things you'll notice about broadband is that you almost never get the advertised speed from a single server. This is because your Net connection cannot deliver data to your PC faster than the server at the other end of the connection can. Of course, when individual servers cannot fill the capacity of the line, these services are very difficult to test.

There are a number of ways to make the most of your broadband connection.

- **Download several files simultaneously.** Having lots of things downloading at once fills more of the available bandwidth. Download managers like GoZilla or GetRight are ideal for this, and newer versions can even perform segmented downloads. These break up single files into small chunks, and download each chunk as a separate file. Raise the limit on the number of simultaneous downloads in these programs.

- **Use Australian mirrors, where possible.** As our test results confirmed, it's the international link that is usually most congested.

- **Have multiple users on one connection.** It's easy to set up Internet connection sharing with Windows 98 SE and 2000, or various third-party applications. You might even be able to connect the link to a shared hub. However, you'll need to check your user agreement first, as some policies ban shared access and others charge an additional fee if they detect it.

- **Choose your access times.** Congestion is at its worst in the evenings (a result of heavy Australian and international traffic). APC's experience is that the morning is generally the clearest time.

- **PCs never sleep.** If you have an always-on connection, like cable or ADSL, set your downloads to go overnight, using a download manager.

How we tested

To assess speed APC tested the broadband connections at three times during the day:



midday — when Australian traffic is average



8pm — when traffic is higher due to people surfing in their leisure time



midnight — when Australian traffic decreases, but US traffic picks up

Testing the services

As this review was conducted during the Sydney Olympics, it was extremely difficult to get comparable services installed by every provider. Those that were invited to participate but could not meet our deadline were Primus ADSL and Telstra ADSL and satellite.

Like every other Internet connection, surfing and downloading on a broadband connection can give mixed results. Speeds, access reliability and download times vary greatly depending on what time of the day you log on, how many people are using the service, what sites you surf, what countries those sites are hosted in and what kind of connection the other end has. Obviously, having a huge data pipe at your end doesn't help if you're connecting to someone who only has a 33.6Kbps modem. For all these reasons, APC's test results should be taken as a guide only.

The results listed with each review show average ping times at each time of day for the US and Australia, as well as average download speeds at each time.

Ping times (the lower, the better) are most important for services that require low latency. If you're looking at online gaming or media streaming, these figures are important. Web surfers will also find services with low ping times better, as page elements are frequently downloaded separately.

Ping times are less important for those who just want to download lots of big files. Here, it's throughput that matters, and the download speeds are designed to give an indication of that throughput. The higher, the better.

We pinged three Australian and three US sites 100 times each, and averaged the figures for each of the three test periods. We also downloaded files of three sizes — 5M, 5.8M and 5.9M — at different times. These were from Tucows mirrors in Australia and the US. We chose different files at each test time to avoid caching at the ISP end, and recorded the average download speed.

Since few people have the luxury of choosing between all providers, we have not awarded an Editor's Choice in this review. Full details of the test procedures, including addresses and IPs of testing sites, are available on our site at apcmag.com.

Your broadband options

Below is a list of the major broadband service providers in Australia, with a rough indication of their coverage areas. Because services vary widely in their coverage, you should check the listed sites for full information.

ADSL

Provider Internet Primus
Online www.iprimus.com.au
Coverage Brisbane, Melbourne, Sydney

Provider Pacific Internet
Online www.pacific.net.au
Coverage Brisbane, Melbourne, Sydney

Provider RequestDSL
Online www.requestdsl.com
Coverage TBA

Provider Telstra
Online www.telstra.com.au/adsl
Coverage All capital cities, some regional centres

Provider XYZed
Online www.xyzed.com.au
Coverage TBA

Cable

Provider iiNet
Online www.iinet.com.au
Coverage Western Australia

Provider Optus
Online www.optushome.com.au
Coverage Brisbane, Melbourne, Sydney

Provider Telstra
Online www.bigpond.com/advance/cable
Coverage Brisbane, Melbourne, Sydney

Satellite

Provider Access 1
Online www.access1.com.au
Coverage NSW, Vic, WA, QLD

Provider chello
Online www.chello.com.au
Coverage Regional areas

Provider ihug
Online www.ihug.com.au
Coverage Australia-wide

Provider Telstra
Online www.bigpond.com/advance/satellite
Coverage Australia-wide

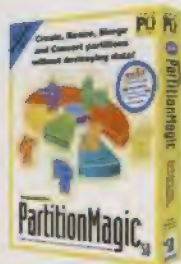
Other

Provider iiNet (Wireless networking)
Online www.iinet.com.au
Coverage Perth metropolitan area

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Whether you choose to manage your data, run multiple operating systems, protect your system configuration, safeguard your files, or back up your entire hard drive, PowerQuest has a solution for your needs.



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Personal
Computer World-UK
March 2000

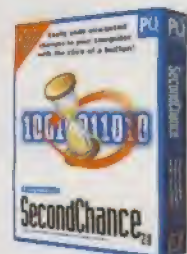


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Total System Backup for Quick Disaster Recovery. Drive Image is the solution to image your hard drive for data protection, backups, disaster recovery and upgrades. Drive Image allows you to create, store, and restore a compressed image of your entire hard drive or separate partitions on removable media or a network.



PC Plus-UK
May 1999



SecondChance® 2.0

Easily Undo Unwanted Changes to Your PC. Recover from system crashes or failed software/hardware installations by rolling your system back to a point in time when it worked properly. This unique solution provides a simple and reliable way to undo the effects caused by a system crash, application conflict, viruses, user error and other system problems.



Computer
Buyer-UK
January
2000

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Myers/Grace Brothers






Office Works

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Pacific Internet

APC has looked at the Pacific Internet ADSL connection before (see APC July, page 34). This was before Telstra had begun the general rollout of ADSL in Melbourne and Sydney. There are now a number of rival services (listed on page 62), but all use the same technology, as they rely on the equipment installed by Telstra at your local exchange. The main differences are found in the pricing and service plans.



TIME			
	136ms	427ms	PING
	22.62Kps	6.64Kps	DOWNLOAD
	149ms	458ms	PING
	14.16Kps	4.99Kps	DOWNLOAD
	182ms	507ms	PING
	13.46Kps	5.59Kps	DOWNLOAD

APC tested the Advance-ADSL 1500 connection, which has a 1.5Mbps download speed and 256Kbps upload speed. The file transfer times varied greatly.

As with the other services we tested, these variations in performance were largely dependent on the time of day, rather than the location. Nonetheless, Australian connections were definitely faster than those to the US, and the service ran slower between 8pm and midnight. Average download speeds ranged from 28Kbps from the US to more than 70Kbps from Australian sites — a good throughput, but lower than the cable services.

Pacific Internet's ADSL account prices are not too bad, compared to other broadband options and considering the speeds available, but you may find the monthly charge rather

steep. At present, only one IP is assigned per connection, but this should increase to eight by the end of the year. Pacific Internet also offers routers for multiple connections on one ADSL line.

Darren Ellis

Pros Good prices

Cons Availability is limited

Contact Pacific Internet

Phone 1300 363 313

Online www.pacific.net.au

Pricing

Installation \$499

AdvanceADSL 256 (256Kbps downstream, 64Kbps upstream) 400M allowance, 15.9c per extra megabyte, \$89 per month

AdvanceADSL 1500 (1536Kbps/256Kbps) 1G allowance, 15.9c per extra megabyte, \$169 per month

AdvanceADSL 4000 (4096Kbps/512Kbps) 3G allowance, 15.9c per extra megabyte, \$990 per month

ihug ULTRA

Satellite connections tie up a phone line. The satellite dish is connected to a PCI card in your system and is used for incoming data only. Outgoing data travels through a modem on a normal connection to the ISP.

This makes surfing slower on a satellite connection than on other forms of broadband. There's a definite pause after clicking on a link, but after a second or so the full page usually pops up on the



screen. If you play online games, satellite is not for you — the outgoing connection is far too slow and causes lag.

If you're into heavy downloads, satellite works well. Outgoing requests are made at 33.6Kbps, but incoming downloads can travel at up to 400Kbps. The satellite uplink for ihug is situated in California, so

unlike most other Internet connection types, surfing and downloading from US sites is much faster than using Australian equivalents. When you surf locally, the request travels through the phone line to the uplink and down to Australia again, where the page or file is selected, goes back to the uplink and then into your PC. When you surf to the States, this trip is only made once.

There were problems with the installation site used for the ihug testing, which made it difficult to connect reliably to the service. At best, our speeds were roughly half those expected, as a problem with the outgoing line caused slow downloads and packet loss. According to ihug, and

some independent customers, a range of 50 to 120Kps per download is usual.

ihug's new pricing has abolished heavy charges for the hardware, includes 30 or 300 hours per month, and doesn't charge for the amount of data downloaded.

Darren Ellis

Pros Good speeds for large downloads

Cons Requires a phone line

Not good for gaming

Contact ihug

Phone (02) 9324 1500

Online www.ihug.com.au

Pricing

Installation \$162.80

ULTRA 30 (400Kbps downstream, 33.6Kbps upstream) 30 hours, \$1.65 per extra hour, \$49.95 per month

ULTRA 300 (400Kbps/33.6Kbps) 300 hours, \$1.65 per extra hour, \$59.95 per month

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☐ Corporation (more than 200 employees)
☐ Computer Reseller/VAR

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E-mail: _____

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How many servers do you want to protect? _____

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- **Lightning and surge suppression** to protect your computer and its peripheral equipment from catastrophic damage
- **Noise filtration** Back-UPS protects against high frequency electrical noise that can damage files and create software errors
- **Quick battery recharge** enhanced charging technology allows Back-UPS batteries to recover from power outages as fast as possible, and ensures they are ready for the next power event

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E-mail: _____
How many PCs do you want to protect? _____
How many servers do you want to protect? _____
Your organisation is:
☐ Small/Medium Business (less than 200 employees)
☐ Corporation (more than 200 employees)
☐ Computer Reseller/VAR

FREE Back-UPS product information and enter me in the draw to win

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☐ **NO** I'm not interested in purchasing APC Back UPS. Please add me to your mailing list.



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Optus@Home

Launched last December, the Optus@Home cable service attracted immediate attention because of its unlimited bandwidth plan. This forced Telstra to offer a similar deal, but Optus has backtracked somewhat since. As reported in *Newsweek* this issue (page 16), the company now has a rolling download limit designed to prevent abuse of the system.

APC last examined the service in May. Since that time, Optus has finally begun offering the

service in units and apartments. This is restricted to Optus' existing cable network in Sydney, Melbourne and Brisbane. You can choose between a 12-month contract or a monthly plan with a higher installation fee.

Our performance tests clearly show that cable offers

higher download and ping speeds, but it is subject to the same performance variables as other Net connections: location and time of day. The network's performance was notably better for local sites, and substantially better when accessed during the day. In one daytime test, we achieved a whopping download speed of 236K per second for a non-cached file.

Installation is relatively straightforward, and Optus advises subscribers to leave the modem switched on at all times to avoid commissioning problems if its network goes down. You can use a USB cable or a built-in network card to

connect to the supplied modem (which consumes a fair amount of desk space).

Subscribers are required to track their own usage to avoid violating download limits. This makes Optus@Home less appealing than it was in its former all-you-can-eat form. However, if you are in an area where the service is available, it remains one of the best value broadband options.

Angus Kidman

Pros Good performance

Cons Limited availability

Confusing download limit plan

Contact Optus@Home

Phone 1800 555 669

Online www.optushome.com.au

Pricing

Warp Speed \$398 installation, \$63.95 per month

Lightning Fast \$199 installation, \$74.95 per month (12 month contract)

TIME			
	18.7ms	392.3ms	PING
	194.3Kps	40.6Kps	DOWNLOAD
	18ms	683ms	PING
	42.4Kps	18.9Kps	DOWNLOAD
	15.7ms	386ms	PING
	45.4Kps	37.5Kps	DOWNLOAD

Telstra BigPond Advance Cable

Telstra has the longest-running cable service in Australia, but has only recently become popular — by offering unlimited downloads. The Telstra service is more limited than the Optus one, as bandwidth is capped at either 256Kbps or 512Kbps downstream. For those who want a Telstra service without the speed limit, volume-charged accounts are still available, but be prepared to pay through the

nose for bandwidth over these thresholds.

Recently, Telstra also put a speed cap on some volume-charged accounts.

Telstra's test results show that its performance varies wildly during the course of the day. At its slowest, you'd be better off with a modem. The best time to use the service

is the morning, when congestion is at its lowest. In the

evenings, performance can drop to below a quarter of the potential rate for international connections. Packet losses increase significantly, and throughput can be very poor.

Like other cable modems, Telstra's connects to a network card in the PC. Custom software logs the client in. It's very easy to set up and operate.

Network blackouts occur about once a day. The client is automatically logged off and has to reconnect manually.

BigPond Advance Cable is worth trying if it's all you can get in your area.

When you factor in phone bills, it costs little more than a dialup connection. However, Optus@Home is a better deal.

Nathan Taylor

Pros The most widely available service

Now has all-you-can-eat plan

Cons Performance varies considerably

Freedom plan has a speed cap

Contact Telstra BigPond

Phone 1800 060 391

Online www.bigpond.com/advance


Pricing

Installation \$189 to \$399, depending on time commitment

Freedom Standard (256Kbps downstream, 64Kbps upstream) \$67 per month

Freedom Deluxe (512Kbps/128Kbps) \$72.55 per month

Blast Off and Business plans (volume charged) start at \$54.95 per month with a 250M threshold and 256Kbps/64Kbps speed limit

TIME			
	69ms	403ms	PING
	39.9Kps	31.2Kps	DOWNLOAD
	117ms	427ms	PING
	19.1Kps	5.37Kps	DOWNLOAD
	143ms	399ms	PING
	20.5Kps	5.19Kps	DOWNLOAD



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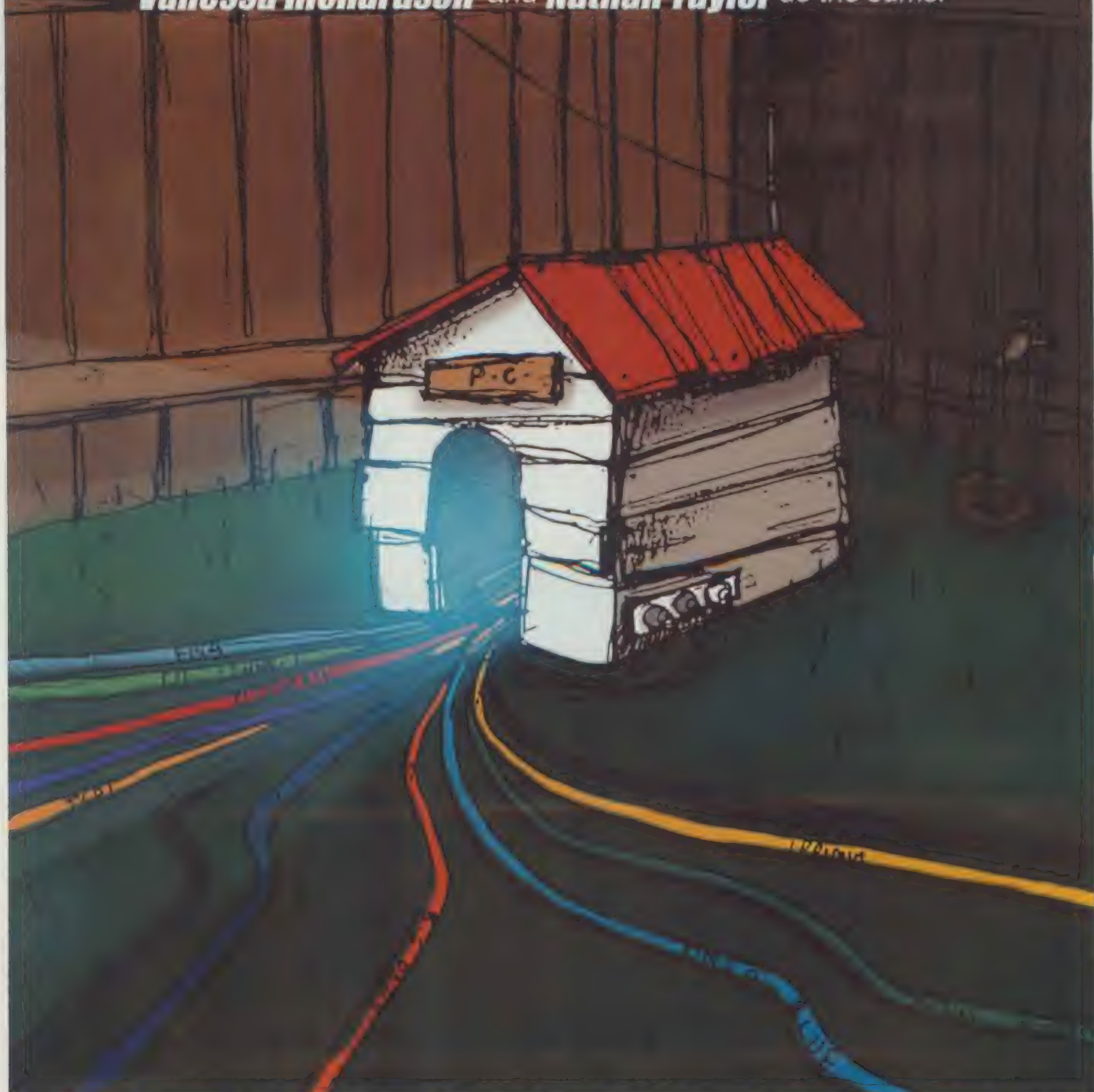
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WHICH ISP IS

The results from APC's annual ISP Service & Reliability survey are in.

Which ISP did APC readers think was the best, and which was the worst?

Vanessa Richardson and **Nathan Taylor** do the sums.



TOP DOG?

Every year, APC asks its readers about their Internet habits and the performance of their ISPs. This year, a survey was published in the August issue and the responses were analysed. This survey represents your experiences with ISPs. On pages 74 and 75, you'll find a summary of results on the ISPs for which APC received more than 25 responses. They make for interesting reading.

The survey revealed how much the ISP scene has changed. There has been some serious consolidation in the past year, and general performance levels and customer satisfaction are definitely on the rise. The majority of the 1,387 readers who responded to this year's survey were happy with their ISP's product. Last year, many readers expressed dissatisfaction with their providers.

Some of the broader trends are also worth looking at. One of the most astonishing is the amount of time people spend on the Net. As the survey responses are drawn from APC's readership, they're probably not representative of society as a whole, but they do indicate how many hard-core Net users there are. According to the results, 79.6% of readers spend at least an hour online per session, and 35% spend at least two hours. On top of this, more than half of the respondents said they access the Internet several times per day, and 85.9% in total said they access the Internet at least once a day. In contrast, last year 77% of respondents said they dial in at least once a day, and 60.9% stayed connected for at least an hour. Average Net use has definitely increased among APC readers.

Frequency of accessing the Internet

A few times a day	725 (52.3%)
Once a day	466 (33.6%)
Once every few days	152 (11%)
Once a week	14 (1%)
Once or twice a month	3 (0.2%)
Other response	26 (1.9%)
Not stated	1 (0.1%)

Joined at the IP

One of the more surprising results is the increase in broadband use among APC

readers. Now that it is available at affordable flat-rate prices, broadband has taken off. This is especially true of cable, which drew 98 (7.1%). Last year's survey registered only 21 respondents (1.3%) using broadband of any kind, and only 10 of these were using cable services.

With its unlimited service and no speed cap, Optus cable uptake was most impressive. More Optus customers used cable modems rather than dialup access. This is unlikely to be borne out in overall subscriber numbers (APC readers are generally at the forefront of technology uptake), but it does bode well for cable services in Australia.

Connection methods

Modem	1,269 (91.5%)
ISDN	8 (0.6%)
Cable	98 (7.1%)
Satellite and modem	7 (0.5%)
DSL	2 (0.1%)
Other	3 (0.2%)

As flat-rate DSL consumer services have only just been launched, it's not surprising that few respondents subscribed to these services. Only two people were using DSL at the time of the survey. However, this will probably increase by the time of next year's survey as services are now available at rates that are comparable to cable.

The low acceptance rate of satellite must be a little disappointing for service providers. In spite of the availability of low-cost plans, the uptake of satellite among APC readers was small: only seven respondents said they were using these services. This is a surprising result, considering the small number of areas that are serviced by cable and ADSL. Even more surprisingly, use of expensive ISDN services was slightly higher than that of satellite, and eight respondents were still using the near-obsolete service.

Despite general increases, overall survey responses suggest that the era of broadband is not yet upon us. Analog modem users accounted for 1,269 or 91.5% of responses. Broadband has made an impact, but it's still a small one.

If you're interested in some of the broadband options available right now, take a look at APC's review on page 60.

How much

Even for readers who are highly conscious of performance and features, price remains the number one reason people choose a particular ISP. In fact, price seems to be more important than ever. Of the respondents to the survey, 60.3% chose their ISP based on the pricing plan available. In last year's survey, only 33% based their choice on price. This reflects the fact that ISPs are becoming harder to differentiate by performance — the modem is now the limiting factor.

The number of people using all-you-can-eat plans has also increased significantly in the last year, but the majority are still using accounts on which a set number of hours are prepaid and additional hours cost extra. This year, 32% of respondents said they had an account that included unlimited use; last year, this number was just 21.4%.

If subscribers to free ISPs are included, this number increases. Still, few readers (7.6%) are using free ISPs at present. Most prefer to pay for their Internet access and avoid the ad banners and difficulties of free ISPs. However, free ISPs are a new phenomenon, and are already heavily oversubscribed. Many people have had difficulty signing up with them. It will be interesting to see how many people choose this option as access improves over the next year.

On another cost-related issue, most respondents don't pay for technical support: 94.7% said they had never paid extra

Current pricing plan

Monthly charge that includes a limited number of hours/download limit	475 (34.3%)
Monthly charge with unlimited use	444 (32%)
Hourly charge	106 (7.6%)
Free ISP	105 (7.6%)
Prepaid block of time	100 (7.2%)
Annual account	96 (6.9%)
Complimentary account	15 (1.1%)
Other response	46 (3.3%)

for technical support. However, of those who had, most (56.8%) believed that the support was worth the money paid.

Picking a winner

There are three main points that people consider when selecting an ISP: price, performance and service. As the tables below indicate, APC readers are generally satisfied with their ISP on all of these counts, but there are some interesting variations in the results regarding particular ISPs.

Since Optus launched its subsidiary dingo blue in July last year, the new ISP has made a big impact on the market. Survey results indicate dingo blue customers are overwhelmingly positive about their choice of ISP. It earned the highest ranking in terms of performance (34.8% of respondents judged it excellent) and value for money (44.9%). Its customer service also achieved the highest overall results: its responses in the excellent and very good categories totalled 75.5%.

Telstra BigPond also rated very highly. It had the highest number of responses describing its customer service as excellent (31.8%), and was in equal first place with dingo blue in terms of the proportion of respondents who considered its performance excellent or very good (78.3%).

Fewer Telstra customers were convinced that their Internet service was great value, but a majority (59.7%) described its value for money as excellent or very good (compared to 91.3% of dingo blue customers). Only 5.2% considered it poor or substandard value for money. Most respondents who had previously used Telstra BigPond said they left because it was too expensive or there were cheaper options (63.3%).

TPGI made it to second place behind dingo blue in the value for money stakes: 68.6% of respondents described it as ex-

How respondents rated their ISP's customer service

Excellent	272 (25.2%)
Very good	356 (33%)
Average	257 (23.9%)
Substandard	87 (8.1%)
Very poor	104 (9.7%)
Not stated	1 (0.1%)

cellent or very good value for money. OzEmail also scored well, particularly in terms of performance, which was described by 63.2% of responding customers as excellent or very good.

One.Net received the poorest evaluation from its customers. It received the largest number of nominations in the 'very poor' category for performance (16.3%) and value for money (7.5%). Although the majority of One.Net users said it was excellent or very good value for money (a total of 58.8%), 17.5% considered the service very poor or substandard value. One.Net has heavily promoted its pricing, and 93.8% of users said price was a reason for choosing it, but once connected a significant number of respondents were disappointed.

The most common reason given for leaving One.Net was poor connections (41.9%), followed by expense (32.6%) and poor customer service (16.3%). It didn't rate well with current users for customer service either: 23.9% described it as very poor and 16.9% as substandard.

The survey results suggest mixed feelings on the part of Optus customers. The majority of Optus users (59.2%) said it represented excellent or very good value for money, but 16.7% felt the service was very poor or substandard value. Unlike its popular subsidiary dingo blue, Optus' customer service was the source of some dissatisfaction. It registered the highest 'very poor' response (24.5%), but 40.8% of users considered it excellent or very good.

EISA also disappointed many customers who responded to the survey: 39.3% con-

sidered its performance to be very poor or substandard, while a comparatively low 27.2% considered its customer service to be excellent or very good.

The survey received more than four times as many responses from former AOL customers than current users. Almost half (47.8%) of the 46 respondents who listed AOL as their previous ISP said they had left for cost reasons, but other reasons included the end of a promotional offer (32.6%) and poor connections (15.2%).

Prize winners

The winners of the Service and Reliability prizes were hand picked from nearly 1,400 responses received by APC.

First prize goes to Em Fetherston-Power of Preston West in Victoria. Em will receive a top-of-the-range Epson Stylus Color 900 inkjet printer, valued at \$840.

Second prize goes to Julie Danvers, from Winnellie in the Northern Territory, who has won an Epson Stylus Color 860, worth \$560.

Third prize goes to Enoch Lau of Panania, NSW, who will receive an Epson Stylus Color 760, a printer that normally costs \$460.

Reasons for changing ISPs*

Too expensive/ others cheaper	387 (36%)
Poor connections	278 (25.8%)
Poor customer service	87 (8.1%)
Too many busy lines in peak times	82 (7.6%)
Promotional offer ended	61 (5.7%)
ISP went out of business/ was taken over	41 (3.8%)
Wanted cable	39 (3.6%)
Moved from the area	38 (3.5%)
Left the place where I had the account	33 (3.1%)
Incorrect billing	26 (2.4%)
Other response	48 (4.5%)
Still using	63 (5.9%)
Not stated	8 (0.7%)

*Respondents could choose more than one option

APC readers' choice dingo blue

dingo blue received the best response from APC readers in this year's survey. The vast majority of its readers were satisfied with dingo blue's prices, performance and service.

How respondents rated their ISP's performance

Excellent	344 (24.8%)
Very good	536 (38.6%)
Average	304 (21.9%)
Substandard	101 (7.3%)
Very poor	101 (7.3%)
Not stated	1 (0.1%)

How respondents rated their ISP for value for money

Excellent	286 (22.6%)
Very good	544 (42.9%)
Average	324 (25.6%)
Substandard	75 (5.9%)
Very poor	37 (2.9%)
Not stated	1 (0.1%)

What happened to the ISP review?

APC has not performed its usual dialup ISP performance review this year, and is focusing instead on the emerging broadband products (see page 60). Judging by last year's results, ISP performance across the board is pretty even. In contrast to results several years ago, most of the major ISPs can now service 56K modems; there's rarely a time when the line is running under capacity. This is reflected in the general reader satisfaction with the performance of ISPs.



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What APC readers said about their ISPs

Total number of responses: 1387

Survey results for ISPs for which APC received 25 responses or more

ISP name	dingo blue	EISA	Free Net	GlobalFreeway	GoConnect	ihug	iiNet
ISP contact number	1300 300 321	1300 300 928	(02) 9635 0505	13 43 43	(03) 9993 7000	(02) 9324 1500	(08) 9214 222
Online	www.dingoblu.com.au	www.eisa.com.au	www.free.net.au	www.globalfreeway.com.au	www.goconnect.com.au	www.ihug.com.au	www.iinet.com.au
Responses to APC (% of total)	69 (5%)	28 (2%)	26 (1.9%)	35 (2.5%)	26 (1.9%)	40 (2.9%)	34 (2.5%)
Time with current ISP*	Less than 6 months	6 months to 1 year	6 months to 1 year	Less than 6 months	Less than 6 months	1 to 2 years	More than 2 years
Top 3 reasons for choosing this ISP, in order*	Price, personal recommendation, connection speed	Price, personal recommendation, local availability	Price (free), personal recommendation, connection speed	Price (free), personal recommendation, received a good review	Price (free), personal recommendation, connection speed	Price, personal recommendation, flexible payment method	Price, personal recommendation, local availability
Most commonly used pricing plan*	Monthly charge with unlimited use	Annual account	Free ISP	Free ISP	Free ISP	Monthly charge with unlimited use	Monthly charge with unlimited use
Respondents who described value for money as very good or excellent (%)	91.3	55.5	N/A	N/A	N/A	60	64.7
Respondents who described value for money as very poor or substandard (%)	1.4	14.8	N/A	N/A	N/A	10	8.8
Respondents who described performance as very good or excellent (%)	78.3	39.3	57.7	45.7	42.3	42.5	58.8
Respondents who described performance as very poor or substandard (%)	2.8	39.3	11.5	14.3	38.5	22.5	8.8
Frequency of busy signals*	Never	Rare	Occasional or rare	Rare	Rare	Rare	Rare
Connection method (% of total for that ISP)	Modem 69 (100%)	Modem 27 (96.4%), ISDN 1 (3.6%)	Modem 26 (100%)	Modem 34 (97.1%), ISDN 1 (2.9%)	Modem 26 (100%)	Modem 39 (97.5%), satellite 1 (2.5%)	Modem 33 (97.1%), ISDN 1 (2.9%)
Frequency of Net access*	A few times a day	A few times a day	Once a day	A few times a day	A few times a day	A few times a day	A few times a day
Respondents who described customer service as very good or excellent (%)	75.5	27.2	57.2	38.5	40	50	62.5
Respondents who described customer service as very poor or substandard (%)	11.3	31.8	14.3	23.1	40	18.8	12.5
Reasons for changing from last ISP*	Better price	Better price	Better price	Better price	Better price	Better price	Former ISP went out of business

* Result is based on the option with the highest positive response rate for each question

What APC readers said about their ISPs

Total number of responses: 1,387

Survey results for ISPs for which APC received 25 responses or more

ISP name	iPrimus	One Net	Optus Internet	OzEmail	Telstra BigPond	TPGI
ISP contact number	1 300 858 585	(02) 9338 8888 or 1 300 303 312	1 300 301 325	1 3 28 84	13 12 82 (Home) or 1800 060 391 (Advance)	1 300 360 855
Online	www.iprimus.com.au	www.one.net.au	www.optusnet.com.au	www.ozemail.com.au	www.bigpond.com	www.tpgi.com.au
Responses to APC (% of total)	86 (6.2%)	80 (5.8%)	122 (8.8%)	68 (4.9%)	202 (14.6%)	38 (2.7%)
Time with current ISP*	1 to 2 years	Less than 6 months	Less than 6 months	More than 2 years	Less than 6 months	6 months to 1 year
Top 3 reasons for choosing this ISP, in order*	Price, personal recommendation, flexible payment method	Price, flexible payment method, personal recommendation	Connection speed, price, flexible payment method	Price, personal recommendation, connection speed	Connection speed, received a good review, price	Price, personal recommendation, local availability
Most commonly used pricing plan*	Monthly charge with time limit	Monthly charge with unlimited use	Monthly charge with unlimited use	Monthly charge with time limit	Monthly charge with time limit	Monthly charge with time limit
Respondents who described value for money as very good or excellent (%)	62.8	58.8	59.2	62.6	59.7	68.6
Respondents who described value for money as very poor or substandard (%)	10.5	17.5	16.7	11.9	5.2	11.4
Respondents who described performance as very good or excellent (%)	58.1	40.1	58.2	63.2	78.3	60.5
Respondents who described performance as very poor or substandard (%)	17.5	32.6	20.5	16.2	8	15.8
Frequency of busy signals*	Rare	Rare	Rare	Rare	Never	Rare
Connection method (% of total for that ISP)	Modem 85 (98.8%), satellite 1 (1.2%)	Modem 80 (100%)	Modem 60 (49.2%), cable 61 (50%), other 1 (0.8%)	Modem 68 (100%)	Modem 163 (80.7%), cable 37 (18.3%), satellite 1 (0.5%), DSL 1 (0.5%)	Modem 37 (97.4%), satellite 1 (2.6%)
Frequency of Net access*	A few times a day	A few times a day	A few times a day	A few times a day	A few times a day	A few times a day
Respondents who described customer service as very good or excellent (%)	42.7	29.5	40.8	52.7	63	54.1
Respondents who described customer service as very poor or substandard (%)	26.4	40.8	32.7	23.7	12.3	4.2
Reasons for changing from last ISP*	Better price	Better price	Poor connections	Better price	Poor connections	Better price

* Result is based on the option with the highest positive response rate for each question



The protests surrounding the World Trade Organisation (WTO) ministerial meetings in Seattle last year are said to have been the biggest in the US since the Vietnam War. Seattle authorities declared a state of emergency and sent in National Guard troops after thousands of demonstrators disrupted the first day of the meetings on November 30, a day activists now refer to as N30.

A few months earlier, a similar protest was held in London as part of the J18 'carnival against capitalism' attracting 2,000 people. This was held on June 18, 1999, to coincide with the G8 Economic Summit in Cologne, Germany. In addition to these mass demonstrations, dozens of J18 and N30 protests were held in other cities throughout the world.

Media coverage of these events was predominantly negative. In London, hundreds of protesters held largely peaceful demonstrations to coincide with N30, but a police van was set alight and an officer

was injured in clashes outside Euston station. It was these events that garnered most media attention. Likewise, the J18 protest was widely reported as London's most violent demonstration in a decade.

Despite this, both J18 and N30 were recognised as major successes for the activists. The biggest protests involved some violent clashes with security forces and a few acts of vandalism, but in all cases, the vast majority of protesters were peaceful. While the mainstream media generally focused on violent incidents and paid scant attention to the views of the protesters, it assisted the activists by giving the demonstrations massive publicity and pushing the WTO into the spotlight. Activists in Seattle say that few people had even heard of the WTO two weeks before N30.

However, N30 activists didn't rely on the mainstream media to get their message across to the public in North America. Adbusters and the Institute for

Consumer Responsibility funded a \$US50,000 campaign. On November 30, CNN aired 60-second 'uncommercials' alongside news coverage of the WTO. The narration — accompanying images of global ecological devastation and market trading — said: "Overproduction. Overconsumption. An unregulated global casino. A world awash in chemicals. Let's go to Seattle and put those issues on the WTO agenda." CNN aired 10 of these TV spots over 10 days, and more than 100 campus stations across North America broadcast 60-second radio spots, starting weeks before the WTO meetings. As a final touch, billboard posters announcing "System Error type WTO (progress)" were erected in Seattle.

Adbusters describes the mass media campaign as "an unprecedented use of the mass media, pointing the way to a potent new brand of social activism". Devised by activists exchanging graphics and text over the Net, the campaign was produced



Organised anarchy

Activists are organising online and taking to the streets in massive global protests, providing the force behind a rising independent media movement.

Vanessa Richardson reports on how technology is inspiring all manner of creative schemes to change the world.

by the Imagefactory. This was just one aspect of the protests that was organised using the Net. Many groups used email lists and online forums to discuss issues and plan demonstrations; the huge turnout for the Seattle protests has been partly attributed to online networking.

Overt manoeuvres

In their reports on J18, the UK media tapped into fears about the power of the Net. The *Express* accused campaigners of using "the latest computer codes" to ensure secrecy while communicating over the Internet and the *Daily Telegraph* said the protest posed particular problems for authorities because "it was coordinated via the Internet".

The campaigners reject these claims, saying that they did not use encryption (or "computer codes"), and that the organisation of the event was open and transparent. The J18 Web site was kept updated with information about events,

and the organising discussion list was open to anyone.

Activists have no doubt that the Internet, and the open access to information that it provides, is now a crucial part of global campaigning. In the cases of J18 and N30, it allowed diverse groups in dozens of countries to communicate and coordinate their activities, and post reports as events occurred. The Sydney Independent Media Centre has a similar approach to organising; its meetings are open and its online discussions, including those about protests, are archived and publicly accessible on its site.

In the lead-up to the meeting of the World Economic Forum in Melbourne on September 11 (S11) and the Olympics, the UK media continued to hype the high-tech protest angle, speculating that Internet activists from previous WTO and World Bank protests were coaching their Australian counterparts. However, the Australian media was far more interested in

the torch relay and arrival of athletes than the impending protests. One matter that sparked media attention was the objection John Farnham's manager Glenn Wheatley raised to the adoption of 'You're the Voice' as the anthem of the S11 protesters. A photo of Farnham appeared on the S11 site alongside a link to download the song from a fan site.

Wheatley was frustrated in his attempts to take legal action to have the link and photo removed from the site, especially as the S11 site was initially registered in the name of News Ltd chief executive Lachlan Murdoch. Both S11 organisers and Wheatley made the most of the dispute to gain media coverage, and Wheatley took the high moral ground, reciting the familiar media line on N30. "One [S11 organiser] said Johnny should get a sense of humour about this. I'm sorry, but I don't see anything funny or humorous about what these people did in the streets of Seattle not so long ago," Wheatley told AAP.

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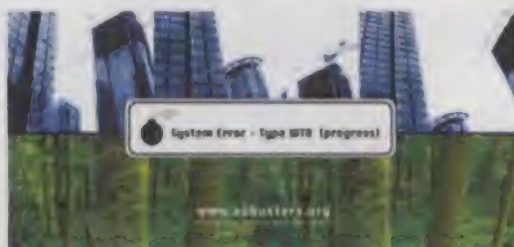
post text or images directly on their sites. This was first adopted by Seattle IMC and then by other IMCs around the world. A link on the front page of IMC sites takes you to a form that allows you to "instantly upload your audio, video, photo or text directly from your browser". IMCs are frequently updated with breaking news from the frontline of protests.

Like many grassroots news sites, IMCs aim for an unmoderated, open access space. The distinction between publisher and audience becomes blurred when anyone can post stories and responses, and participate in discussions.

Media activist John Jacobs said he thinks the most radical aspect of Sydney IMC is that people are given the opportunity to publish their own stories. He hopes that by attracting a range of perspectives on the Olympics, the site will provide a more complex and realistic picture than that presented by the mainstream media.

You might expect this kind of policy to attract all kinds of spam, but local sites have not had this problem. Matthew Arnison said that very few items have ever been removed from the active-sydney site's news section — just a few posts that have been completely off the topic.

To avoid the hassles of removing unsuitable articles from news pages, and presumably the dilemmas of deciding what is unsuitable, Philadelphia IMC recently adopted the mass moderation system developed by Slashdot (the Slash source code has been released under the GNU General Public Licence). Readers who wish to participate in the "editorial collective" can now rate



▲ Billboard posters were part of the N30 campaign in Seattle.

news stories, and the average rating given to a story determines its position in the site layout. The average rating is displayed beneath the articles, and it links to a list of individual ratings and comments. The idea is that the most useful and important material becomes prominent while irrelevant material slides into obscurity.

While IMCs have developed into a prominent global network of media

organisations, a diverse bunch of other activist groups have also been exploiting the Net in one way or another.

Active started with a Sydney-based interactive forum for social change about 18 months ago, and has now spread to five Australian cities and one US city. Critical Mass, the cycle activist group that takes to the streets in hundreds of cities around the world once a month, makes extensive use of email mailing lists and Web sites. Local groups use the Net to coordinate Reclaim the Streets events internationally. Reports and images, including some live footage, are posted during the car-free street parties.

Stick it on the Web

Some more obscure organisations have found novel ways of communicating their ideas. You are unlikely to accidentally stumble across www.geocities.com/thehumanmind online, but if you were in London a few months ago, you would have seen the URL throughout the tube network, on bus stops and in the streets — on stickers calling upon people to protest naked outside Scotland Yard. This demonstration was one of a series devised by the group Freedom To Be Your-

www.oznetwork.com.au

online australian

Daniel Petrenko – 28

Daniel is addicted to exercise and his career. Juggling both is an artform. Each day, Daniel relies on OzNetwork as his homepage, with personalised share quotes, news, mail and stars.

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self, which famously included the arrest of naked protester Vincent Bethell in the fountain at Buckingham Palace. The group has also appeared naked at protests such as May Day and J18. Bethell claims he will now remain naked until nakedness is legalised, which is bound to mean a lot of time spent in court. He has already been arrested twice while leaving court naked, after being charged in relation to being naked. The group's site is now promoting a global naked protest in July 2001.

The stickers may not have succeeded in coaxing masses of people to get their gear off in public, but they certainly attracted public and media interest to the campaign. London activist Luther Blissett (one of many people going under this name) said that posting stickers with URLs in public places is common for groups in London, and is a natural extension of a long tradition of using stickers and posters to publicise protests.

"In the past, people have included contact addresses for people to write off to for more info, but URLs have the advantage that people can just scribble them down, and then check them out immediately when they get to work or home. This is more effective for a number of reasons — it's physically easier (no stamps, envelopes and so on) and gets around people's understandable reluctance to give fringe groups their home address so they can be sent something."

The Net has helped to cultivate a crop of small-scale groups (some consisting of just one person) with individual approaches to changing the world. Many activists are shying away from the bureaucracy and inertia associated with big organisations to embrace organic networks of smaller groups. Some groups of this kind exist solely on the Web; others organise events, protests and parties, or print free newsletters.

Small groups appeal to many people as a way of escaping hierarchical structures and introducing creativity and spontaneity into their activities. Blissett has observed the recent emergence of "a network of groups that are doing weird stuff, which presents a multitude of ways for people to be exposed to unusual ideas".

The Web is perfect for documenting the work of groups that operate in several countries and span many different activities. It seems like the logical home for community-based space program the Autonomous Astronauts Association (www.seeyouinspace.org) or the Luther Blissett project (www.LutherBlissett.net), which invites you to adopt the "multi-use name for communication, guerrilla warfare, hacktivism, sivil disobedience [sic] (electronic and not) and radical myzopoesis".

It can be difficult to discern the size and credentials of a group from its Web site, but many groups see this as an advantage, as the public focus is on the group's ideas and activities, not the people behind them.

Some groups have an explicitly anti-capitalist agenda. Decadent Action describes itself as "a High Street anarchist-guerrilla organisation whose main aim is to destroy the capitalist system by a leisurely campaign of good living and overspending" (see www.underbelly.demon.co.uk/decadent). The group founded World Phone in Sick Day, which was subsequently taken up in the US by RTMark (rtmark.com), which describes itself as a "US-based corporation whose bottom line is cultural profit". RTMark channels funds into specific projects aimed at sabotaging corporate products.

"There is a danger that the convenience of Net activism will end up excluding the most dispossessed, which kind of defeats the object of being involved with revolutionary politics."

To coincide with the N30 activities, RTMark launched Gatt.org, a copycat site of the WTO's own site at www.wto.org on November 20, 1999. Media releases were issued by both parties, each condemning the other's Web site, and the prank gained wide publicity. In its archive of projects, RTMark notes "Strangely and ludicrously, more space on the WTO Web site was devoted to Gatt.org than to the physical protests themselves, or to the protesters' concerns. Fortunately, the mainstream press did not follow suit."

It's tricky

The Net has assisted small groups to form international networks and has made vast amounts of information accessible to millions of people, but Net-based activism faces some challenges. Ensuring that information is relevant and its presentation is workable is still a problem for sites that are open to submissions from anyone. Copyright is another thorny issue, and some groups are still experimenting with 'copyleft' arrangements, whereby the material they publish is made free for nonprofit use, but fees are charged for commercial distribution.

Australia has a relatively high level of Internet use, which has helped to keep Australian groups at the forefront of Net activism, but Net users are still a minority (see 'The Digital Divide', APC August, page 68). Nua Internet Surveys estimates that 332.73 million people accessed the Net in the three months to June 2000, which is only about 5% of the world's population.

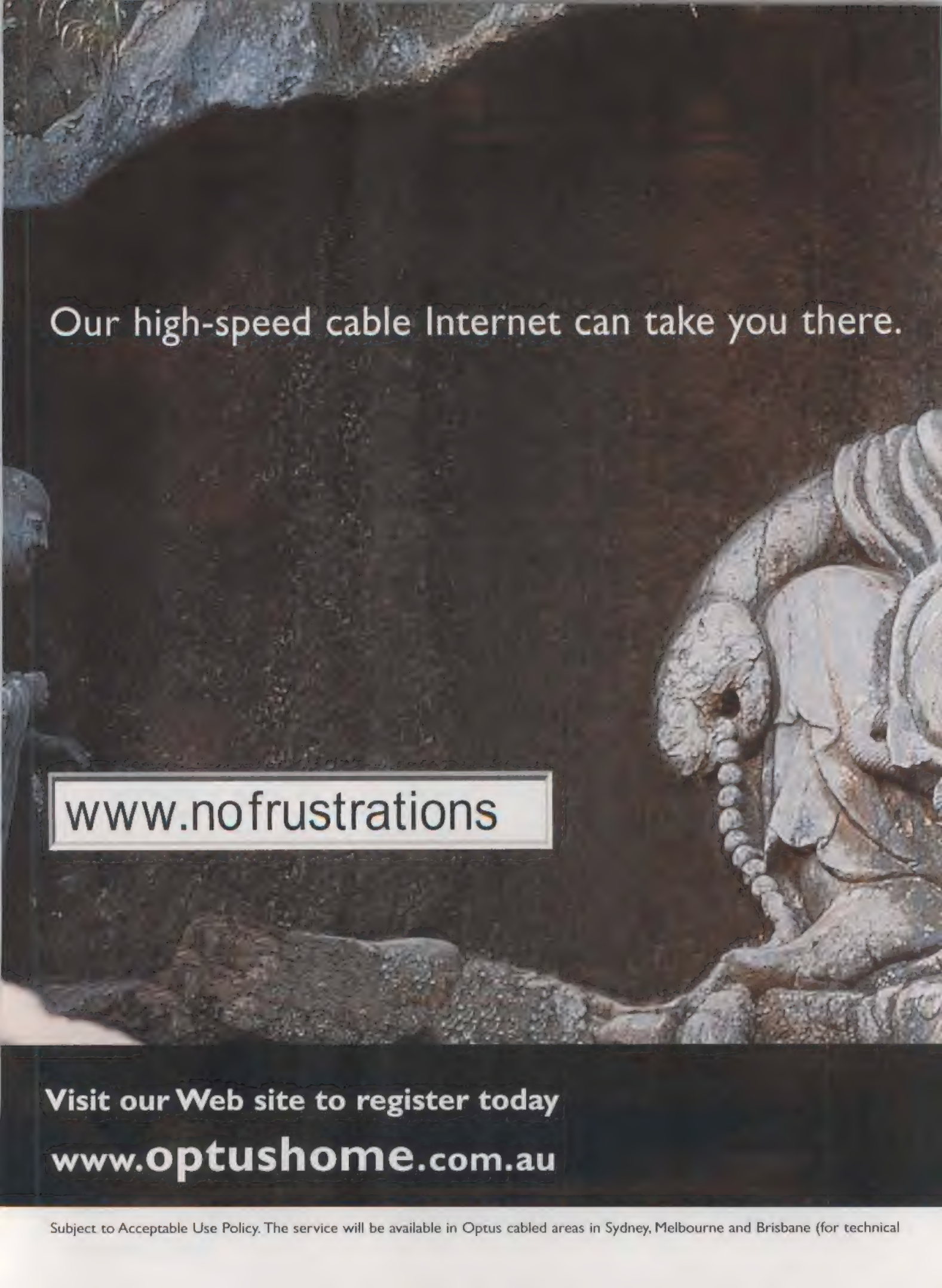
Many groups make sure that they keep up communications in other media, but they recognise that many people, even in wealthy countries, will continue to be excluded from online activities.

"There is a danger that the convenience of Net activism will end up excluding the most dispossessed, which defeats the object of being involved with revolutionary politics," Blissett said. "I think it's possible that a lot of people will fall into the trap of organising on the Net instead of on the streets, or where they work and so on. On the other hand, globalisation requires global resistance and the Net will be a big part of that."

For those with access, the Web makes it easy to research many topics that other media gloss over. People can look up sources online and often contact them directly, but misinformation can be an even bigger problem online than in the mass media. Those familiar with the Web tend to be critical of the information they encounter, and the increasing use of online news might encourage more people to scrutinise all information sources, online and offline, but this remains to be seen.

In some cases, the mainstream media and government authorities have reacted very strongly to Net activism. In the UK, the controversial RIP Bill (expected to be law by October 4) was introduced in the midst of media condemnation of recent large protests. The bill gives government agencies far-reaching powers to monitor personal email and gives the British Home Office the right to demand the encryption keys to any data communication.

However, activism and anarchism continue to flourish on the Net. Matthew Arnison believes that we are entering a second wave of Internet activism, and the momentum is building as groups begin to collaborate internationally. "The Internet is based on a lot of activist work carried out by volunteers. The ideal of providing information without the constrictions of editorial control or censorship are in the bones of the technology. The free software movement is also highly political, although many people involved with it don't recognise it. Now political activism and technical activism are coming together and Net technology is being used in ways that are far more explicitly political." ■



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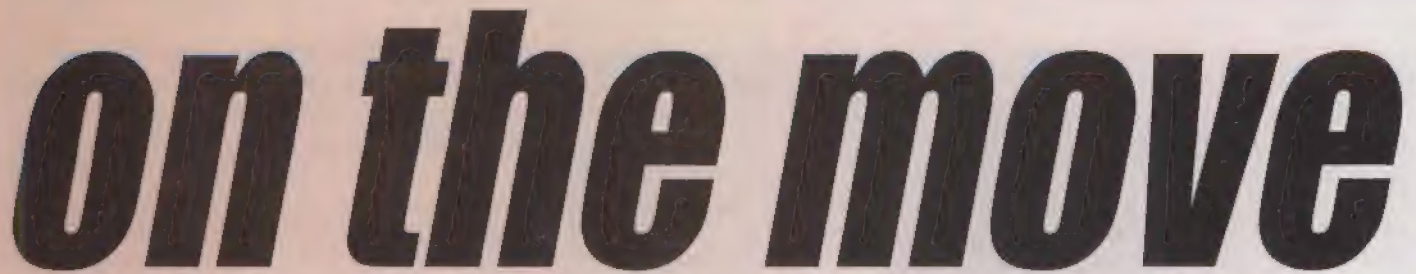
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Managing



on the move

*New handheld devices have more flexibility than ever. Basic organisers have dropped in price, and if you have more to spend on a handheld PC, you can display images, play music or even have mobile phone features. Palm has long been king of the hill, but it is now facing some serious challengers. **Jeremy Torr** lines up the best PDAs the world has to offer.*

One of the toughest decisions made while writing this review was what to call the products: 'personal digital assistants' is old-style; 'connected organisers' is slightly down-market, 'palm devices' doesn't do them justice, and 'pocket computers' is just that bit too optimistic. So, we might have to invent a new class — mobile data managers, perhaps.

The differences between models and makes are significant. The three major areas of development at the moment are colour, memory and expansion. Colour is definitely on the way in, although many makers such as Palm, Psion, TPG and Casio are all continuing with monochrome units because of their lower cost and power consumption. The big advantage of colour is that it displays images much better, and for more complex menu systems, it definitely makes operation easier. However, for most text-based applications, the benefits of colour are still limited.

The second factor, memory, was looking promising until recently, when prices started to reinflate. Consequently, the median price of pocket devices hasn't shifted much in the last year, despite increased sales. Windows CE (now Pocket PC) units with higher specs have been hit hardest, because they carry large amounts

of RAM as standard (up to 32M). Palm, and more recently Casio, continue to churn out units with just a couple of megabytes of memory. This has allowed a corresponding downward price trend at the low end, with workable devices available for just over \$300.

The third factor, expansion, is probably the hottest area right now. Most people are moving away from using their device as a simple Filofax replacement, and are looking for more features. Communications, music playing and image viewing are definitely in. Consequently, manufacturers such as Compaq are coming up with new and innovative solutions like the iPaq backpack, and most other makers are now including expansion slots in their products.

The key issue here is not simple memory expansion, but peripheral connection capability. Software programs allied to the right firmware extensions can now upgrade a simple organiser into a Web browser, pager, GPS moving map, barcode scanner, camera, and even a device capable of mobile phone functions.

However, the main limitation of all these devices is still battery life. Palm has grabbed an amazing 70% or so of the market with its fundamentalist approach that enables longer periods without battery recharges. As Claudia Romanini, Palm's director of mar-

keting development, puts it, Palm's approach is to allow technology to mature before incorporating more power demands into the device. "We don't want to over-complicate our products, because that compromises the functionality. Although things like sound are very important, there's no point until we can do it properly," she said.

Despite Palm's market dominance, there is no doubt that the other platforms — Psion included — are conditioning the market to expect brighter, more flexible and more expandable products. Sony's entry into the market, with a Palm OS-based device that includes colour and Web connectivity as well as MemoryStick expansion, is a good indicator of what is to come. The Compaq iPaq shows what can be done with a powerful processor running Pocket PC. It highlights the advantages heavily specced and higher-featured Pocket PC devices bring to tight Microsoft Office-based desktop integration, especially in the corporate environment.

With all these developments in handheld devices, only a handful of serious players, including newcomer Motorola, are staying the course and wearing the expensive design and initial production costs. Of course, this is all good news for consumers as ever more useful, powerful and stylish mobile managers appear.

Casio EM500

The Casio EM500 uses stamp-sized MMC-format expansion cards instead of CompactFlash. Otherwise, it's a standard Pocket PC unit. Controls are the usual buttons for contacts and calendar access, a menu button and a neat four-way toggle scroll controlled with a 'go' button in the centre.

The side of the case carries an IrDA window, another thumb-wheel scroll/action button, a voice recorder button and the power switch. The top panel offers a stereo-out jack, the MMC slot and a stylus holder. One problem with having so many buttons is that the voice recorder often cuts in as you pick up the unit; it's too easy to accidentally press one of the buttons.

The EM500 connects to a PC through a sync port on the bottom. This is covered by a standard Casio rubber flap that is likely to be immediately misplaced. The syn-



chronisation process can run through either USB or serial ports, through cradle connections. Having both is smart for those with dual connectivity requirements.

Power is provided by a 1,100mAh lithium ion battery which lasts about six hours between charges. A MIPS VR4122 running at 180MHz and 16M of RAM provides the internal go.

The unit APC looked at was a first sample and we had some difficulty locating USB ports and drivers. Once this was sorted, ActiveSync 3.1 was fast and effective, with synchronisation and drag-and-drop translation provided.

The screen was the smoothest of all those reviewed, with a staggering 64,000 colour range, and it was easily the best for viewing photos. However, it lacked the bright and crisp look of the Compaq and Hewlett-Packard units. Overall speed of operation was good, but some slowing was noted when running applications

concurrently, even though Casio supplies bTask app management to help reduce clogging.

The software bundle includes a video player, picture album, mobile email and a golf game. Supplied ROM applications are pocket Microsoft Word, Money and Excel. A problem with the MMC expansion slot is the current lack of modems, network cards and scanners in the format. Judging by the style (colours include yellow and red) and price, the EM500 seems aimed more at the youth market. If so, it can be seen as a clever digital photo and audio player, albeit an expensive one.

Pros Superb screen
Fast processor
Cons Limited expansion options
Expensive

Contact Shiro
Phone (02) 9370 9100
Online www.casio.com
Price \$1,199

Casio PV750

Casio's new PV750 is a thorough reworking of the pocket organiser concept (PV stands for Pocket Viewer). It has been upgraded to synchronise desktop data, link to mobile phones, exchange email, track expenses and provide a jotter pad — all as part of the underlying OS.

Casio has obviously done a lot of work on this product and it's way ahead of the Palm for application breadth. However, it isn't anywhere near as easy to use. It doesn't have handwriting recognition, and its '80s-style desktop link application is very clunky (but you can link into Outlook by downloading an extra applet off the Web). Its tip-tap requirements make Microsoft's Pocket PC menu-heavy interface look sparse. On top of this, the unlikelihood of extensive developer support puts the PV's future in doubt.

However, the design is neat, with a blue flip lid covering the 130 by 130 plas-



tic touchscreen, and a simple scroll/enter button on the left side. All other input is made through the stylus and screen icons as there are no one-touch buttons.

Inside the unit is a proprietary CPU and 2M of RAM, powered by two AAA batteries. According to Casio, they will last for up to 160 hours, and it didn't go flat during APC's testing. However, using the built-in IrDA modem will reduce battery life.

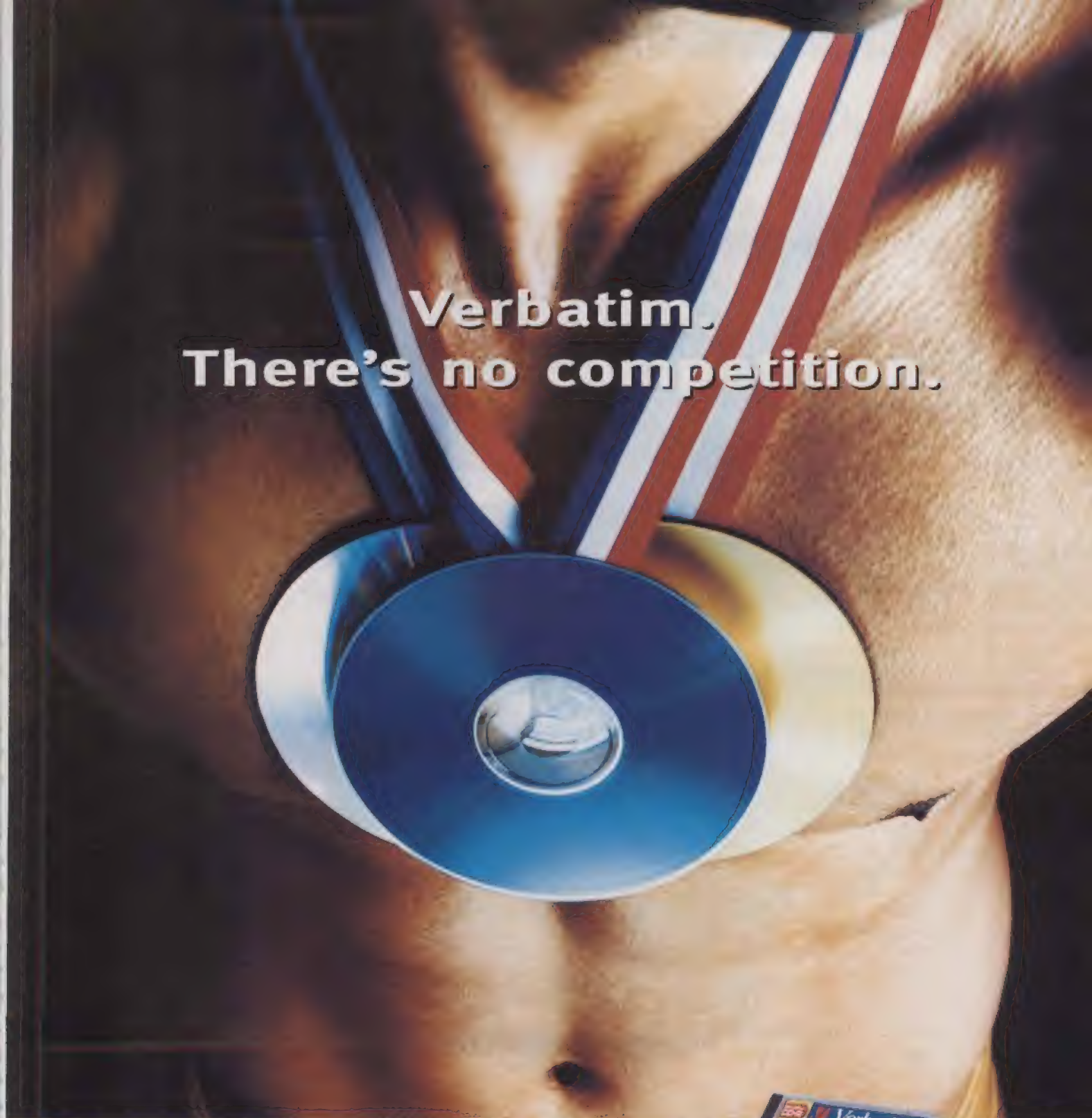
The modem sits on the right side, just above the synchronisation port on the bottom edge, which is used to connect to a host PC through the serial cradle.

The PV is very quick, but because of the innumerable stylus taps required to perform any task, it is slower in practice than many others. Entering a full address using the pop-up virtual keyboard is particularly fiddly.

All the applet views are clear and sharp, but the backlight is not very good. The usual schedule, contacts, and memo sections are included, as well as a couple of games and a currency converter. The PV's main advantage is its ability to send and receive email through any mobile phone. Setting up is relatively straightforward and phone type plus all TCP/IP settings are easy to configure using the comprehensive manual. You then tap in a message, hit send and place it next to the IrDA-compliant phone and you are connected. However, even with this capability, the PV750 begs the question, 'why did they make it?'

Pros Nice design
Inexpensive
Long battery life
Cons Painful input
Little additional software

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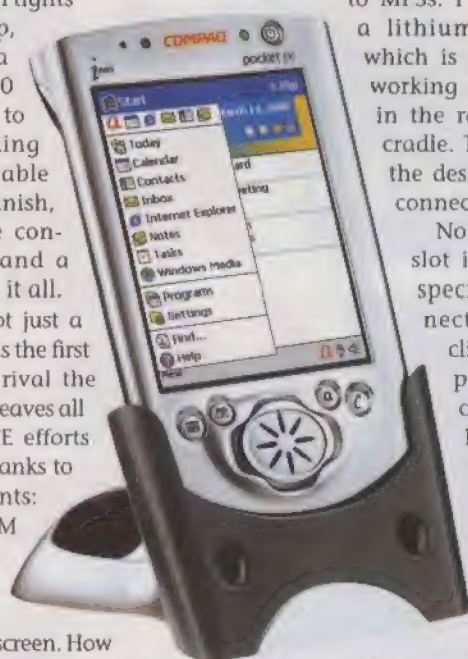
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Compaq iPaq H3000

If you want to look like *Star Trek's* Captain Kirk, you can don tighties and a crimplene top, or just get yourself a Compaq iPaq H3000 Pocket PC. This has to be the slickest-looking mobile device available — smooth chrome finish, a deep-space toggle control/speaker grille and a pop-out stylus: it has it all.

Even better, it's not just a good looker. The iPaq is the first Pocket PC device to rival the Palm for speed, and it leaves all previous Windows CE efforts well behind. This is thanks to two major components: the Intel Strong-ARM CPU, which runs at 206MHz (50% faster than the Jornada), and the superb colour screen. How Compaq has squeezed all this and 32M of RAM into a casing only slightly bigger than a standard Palm unit is a mystery.

Input and output occurs through an IrDA window on the top panel, a micro-



phone and a stereo-out jack for listening to MP3s. Power is supplied by a lithium polymer battery which is good for about two working days after charging in the rather weird-looking cradle. The iPaq connects to the desktop through a USB connection.

No standard expansion slot is included, but the special expansion/connector bus allows for clip-on external backpacks that can accommodate standard PC Cards as well as CompactFlash cards. This means a slimmer basic unit, with much better expansion than is usual for a pocket device.

The controls are the standard on/application buttons plus a four-way toggle and voice record button. Like several other makers, Compaq has dispensed with the memo button; it uses a 'QMenu'

key that gives access to a graphical menu of applications.

Once you get the hang of the tiered menu system, the iPaq is as easy to use and navigate as any Pocket PC device. The firmware-based QStart task manager applet is a godsend as it allows tasks to be closed with one button click. This dramatically reduces the program clog that cripples many other CE-powered units and enables faster operation.

Overall, this is a very impressive unit with excellent performance and the best screen. The only problem is that, for a few more dollars, you could almost buy a cheap notebook.

Pros Fast
Brilliant screen
Fantastic design and expandability

Cons Expensive

Contact Compaq
Phone 1300 301 310
Online www.compaq.com
Price \$1,245

Ericsson MC218

For mobile managers, connecting to data sources is just as important as host connectivity. These days, email access is often a matter of urgency on the road. Palm and Windows CE devices can do this with the help of some third-party add-ons and plug-in modems, but phone maker Ericsson has taken another route by starting with the phone, and working backwards. It has rebadged the Psion Series 5, loaded some communications-specific software into ROM, included a neat clip-on IrDA modem and wrapped the whole lot up in a Filofax-sized pouch.

The MC218 has some great features such as the slide-out keyboard and built-in, button-controlled voice recording, as well as an easy-to-use combination of keyboard and touchscreen. The screen is 640 by 240, and surprisingly clear in most lighting, particularly with the green backlight in action.

The keyboard is almost big enough to type on, and sits at a comfortable angle when open. A CompactFlash slot sits under the left end of the keyboard, alongside the microphone, and just in front of the battery bay on the back, which takes two AA



batteries. An IrDA window, RS232 serial mini-socket and a stylus are also included.

The DI27 accessory modem is designed to clip onto the bottom of Ericsson phones, and enable one-touch connection to the Net — which it does without all the usual configuration worries and hassles. The 36MHz ARM CPU works in tandem with 16M of RAM, and the EPOC OS comes with a huge array of useful and highly desktop-compatible applications built in. Along with the usual PIM applets, graphing, spreadsheets, imaging, word processing and jotting are all available and you can exchange files directly with most office programs.

The voice recorder links all files together, so if you delete one, they all go west, which is rather silly.

Setting up and using the MC218 is generally very easy, even when configuring the Net access module. The serial link to the desktop allows direct interaction with Windows Explorer, enabling drag-and-drop of existing files as well as the standard synchronisation approach.

This is a well-integrated package that avoids many of the pitfalls of other mobile communications solutions. What a shame the screen isn't colour.

Pros Integrates well with Ericsson mobile phones
Simple
Full-featured

Cons Expensive
Not so useful if not used with Ericsson phone

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Hewlett-Packard Jornada 545

The Jornada 545 was the first mobile manager in Australia to use Microsoft's new Pocket PC platform, and it certainly stands out from the crowd. Its smooth, dark alloy casing, sharp, colour screen and well-designed controls are a welcome change from its rectangular, hard-edged predecessors. Inside the case there's a 133MHz Hitachi chip and 16M of RAM. The usual IrDA window and Type I CompactFlash slot complete the interaction/expansion capabilities, with a docking and power connector on the bottom edge of the unit.

The Jornada recharges and syncs only through the cradle (a very chunky affair), which means extra weight to cart around when travelling. The controls are the usual four application/menu/on buttons, plus a power/on button under the screen. A scroll/enter button and a voice recorder switch complete the input options.

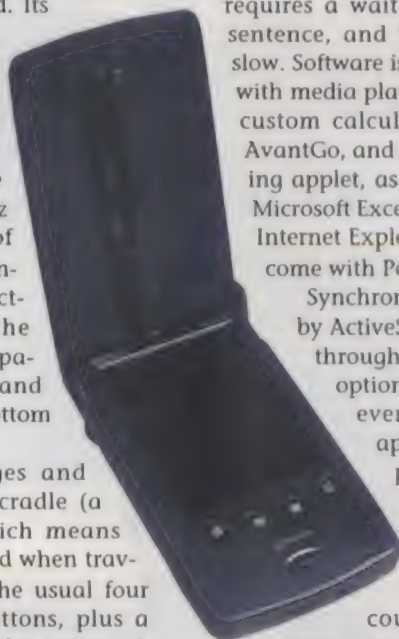
Data is entered through the touch-

screen, using either Transcriber word recognition, or a virtual keyboard. The first option is surprisingly good, but requires a wait at the end of each sentence, and the second is pretty slow. Software is extremely generous, with media player, money manager, custom calculator, image viewer, AvantGo, and a special Palm beaming applet, as well as the standard Microsoft Excel, Word, Outlook and Internet Explorer applications that come with Pocket PC.

Synchronisation is catered for by ActiveSync 3.1, which works through a USB link, with an optional serial cable. However, the screen, clever applets and more complex interface all take their toll on the Hitachi chip's performance. If you open more than a couple of programs, even simple operations like dimming the screen slow to a crawl. Hewlett-Packard has included a special Task Manager to close unused applica-

tions, but it takes several clicks to get to it, unlike Compaq's much more accessible QStart task manager.

The unit is also heavier than average, possibly due to the nonreplaceable lithium ion battery. It is one of the best non-Palm devices, but it will make your jacket sag noticeably. On a brighter note, it has an excellent programming utility to enable custom key mappings for your favourite games, and a very comprehensive power usage option suite to maximise the eight hours or so of battery life. For a Pocket PC device, it's cheap too.



- Pros** Cheap for a Pocket PC device
Good applications
A looker
- Cons** Battery not replaceable
Can be slow

Contact Hewlett-Packard
Phone 13 13 47
Online www.hp.com
Price \$979

IBM WorkPad c3

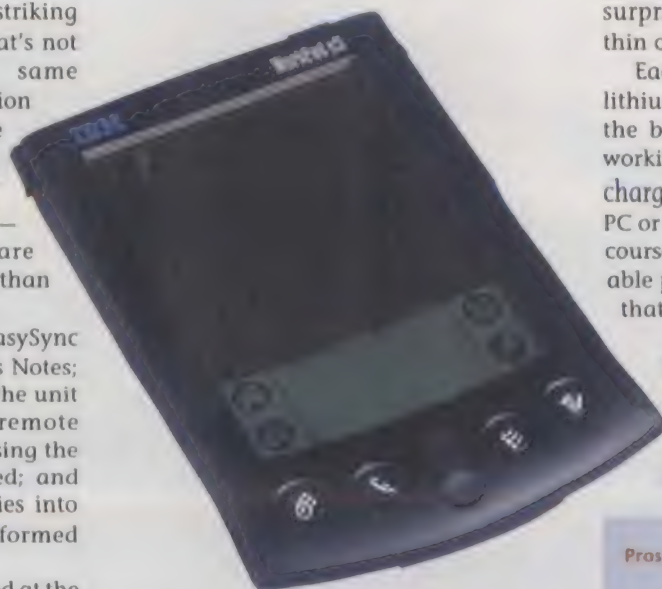
The IBM WorkPad c3 bears a striking resemblance to the Palm Vx. That's not surprising, because it's the same machine from the same production line, the only difference being the black casing.

IBM has priced it lower — only \$40 or so, but definitely cheaper — and added a couple of software extras. So the c3 looks even better than Palm's name-branded device.

Extras are included: Lotus EasySync for direct data backup into Lotus Notes; IBM Mobile Connect for linking the unit into mobile networks using remote access; IBM Mobile Net for accessing the network once you are connected; and DB2 Everywhere to enable queries into remote DB2 systems to be performed and synchronised.

All these applications are aimed at the enterprise market, and would be of little or no interest to most people. However, for businesses looking to incorporate mobile management into their existing network, the c3 is hard to beat.

The box contains the unit, a universal charger, a surprisingly comprehensive manual and a synchronisation cradle that is not travel friendly. All the hard-



ware inside the alloy casing is exactly the same as the Palm Vx, with 8M of RAM and the latest Palm OS 3.5, plus special instructions for synchronising direct to IBM WorkPad notebooks through the infra-red port. This backs up the standard serial port connection to the synchronisation cradle. The USB option is not used as standard, which is

surprising given IBM's drive towards thin client, USB-kitted desktops.

Each sync session tops up the internal lithium ion battery automatically, but the batteries have enough go to keep working for about four weeks after a full charge, which is much better than Pocket PC or Windows CE units can manage. Of course, there are squillions of downloadable programs on the Net to help fill up that capacious 8M of RAM.

All round, the c3 is as good as the Palm Vx in every respect, but with extra value and a lower price. If IBM offers bulk corporate discounts, this unit could start to look very attractive.

- Pros** Exactly the same as the Palm Vx, but cheaper
Additional software
- Cons** A little dated

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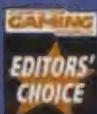
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Motorola Accompli A6188

What's this — a mobile manager or a phone? Actually, it's both. The A6188 uses a specially developed version of Starfish Sidekick to handle desktop dates, contacts, memos and so on. Then (and this is the clever part) it ports the data across to the Accompli through an infra-red or cable connector. It can then be used to dial numbers, access the Internet through the built-in WAP phone capability, and send and receive emails.

Like the Palms, the Accompli uses a Dragonball chip working with 2M of memory, powered by a chunky lithium ion battery with about three days of life, depending on the number of voice calls and WAP sessions.

The unit is smaller than most, and uses a flip cover which doubles as



a phone earpiece. The touchscreen is about 75% the size of the Palm m100, making it pretty tiny. Controls include an on/off button, up and down scroll/soft menu buttons under the screen, plus a home key. A thumb scroll wheel sits on the left side, which can be pressed to select entries or actions.

The top panel houses an IrDA window and an earphone socket. A stylus is also supplied. Connection to the desktop PC can be made through serial cable, a charger/data port on the bottom edge or through the IrDA port.

The Accompli isn't quite as fast as the Palms, but makes up for it by loading up the standard OS with everything but the kitchen sink. As well as the usual addresses, date book and memo pad, there are messages, calls,

a WAP browser, voice notes, dictionary, calculator, games, world time and a scribble pad. Input is available through English and two Chinese virtual keyboards, as well as the Wisdom Pen text recognition application. The 240 by 320 resolution plastic screen is easy to read.

The Accompli is tiny, but it is also straightforward to use, with very well-structured menus and display pages. Some functions, such as cut and paste, or data beam, are missing, but the Accompli does a very decent job all round, and works well as a phone too.

Pros A mobile phone and handheld
Good screen
Easy to use
Cons A bit slow
Lacks some of the mod cons

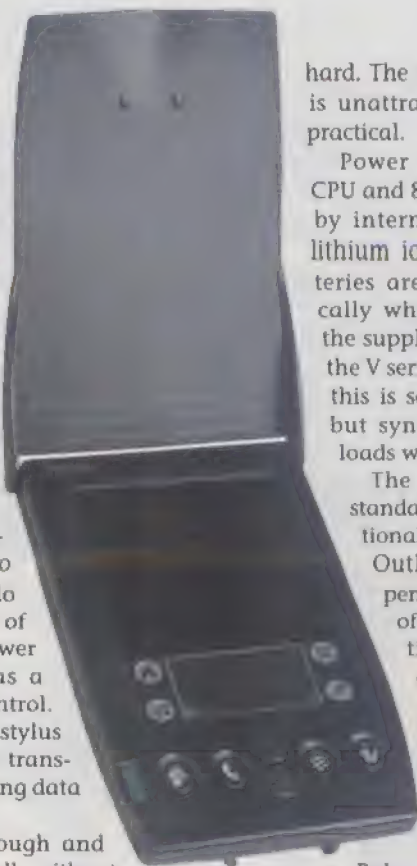
Contact Motorola
Phone 1800 667 788
Online www.motorola.com
Price \$800

Palm IIIc

Frankly, the Palm IIIc's 256-colour screen is lacklustre. The absence of super-bright backlighting means longer battery life between charges — Palm claims about two weeks — but the advantages this quality of colour brings to the simple Palm OS 3.5 interface are debatable.

In other respects, the Palm IIIc is very similar to its predecessors. The case has the usual four-button controls with direct access to date book, contacts, to-do and memo, plus a pair of scroll buttons, and a power button that doubles as a backlight brightness control. The top edge houses the stylus and a custom infra-red transmitter window for beaming data to other Palms.

The screen is very tough and resists extra pressure well, without moiré patterning even when pressing



hard. The flip lid that protects it is unattractive, but extremely practical.

Power for the Dragonball CPU and 8M of RAM is supplied by internal, nonreplaceable, lithium ion batteries. The batteries are charged automatically when synchronising in the supplied cradle, rather like the V series. In the standard kit this is serial, not USB linked, but syncs and program uploads were still very rapid.

The unit comes with the standard Palm Desktop, additional automatic links into Outlook, Excel-based expense charts and a range of email clients. Applications from AvantGo and AlbumToGo are also included to allow download of Web data and image viewing.

All the usual comments about Palm devices apply to the IIIc. It's as easy and logical to use as any,

but the addition of a blue tinge to the text makes almost no difference to operation. The only other colour element in the standard form is a yellow highlighting feature, which is equally ineffective. The images on AlbumToGo are pleasant, but 256 colours at 160 by 160 resolution isn't stunning.

In most respects, the Palm IIIc cleverly demonstrates that technology can find a solution — but the Palm platform didn't really have any problems for colour to solve. Consequently, you do the same things, but get less battery life and more weight than with the equally priced Palm Vx.

Pros Easy to use
Plenty of applications available
Fast
Cons Colour not well utilised
Heavier and with shorter battery life than the Palm Vx

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Palm m100

The newest, funkiest and cheapest Palm yet, the m100 harks back to the original PalmPilot with its basic functions, appealing looks and bargain price. Designed to fit the hand with its curvaceous case and clever double-hinged flip lid (much better than the Palm IIIc's awful cat flap), the m100 is the cheapest of the brand name units.

Controls are very simple, with the usual scroll keys, plus four on/function buttons for calendar, contacts, to-do and jotter pad. The latter has displaced the memo pad (which is still there, hiding under the applications menu), and offers onscreen scribble graphics, which can be copied to the desktop clipboard and then into applications.

Other data entry is possible through Graffiti character recognition in two rather small entry windows. The power



switch is hidden under the cover when closed, but one of the up/down scroll buttons can be accessed through a tiny hole in the flip. When pressed, this flashes up the time and date through a special window, with backlight if the button is held down. This sounds like a small addition, but is extremely useful.

Power is supplied by two AAA batteries, and the unit comes with the standard infra-red beaming window on the top edge. Inside is 2M of RAM. Other up-grades include time and contrast icons, louder, selectable alarms, and replaceable coloured faceplates for added street cred.

The application CD comes with AvantGo and Outlook Sync, as well as the basic (but effective) Palm Desktop. The main change is the screen. This is made of plastic, and is much tougher than glass-based ones (APC dropped it to

check), but it is noticeably smaller than previous Palms. This makes locating entries slightly harder, but the decreased dot pitch makes the display sharper.

The HotSync connects through a serial cable that plugs directly into the base of the unit: no cradle is used. A USB cable is available, but it costs extra. Operation using the new OS 3.5 was fast and crash-free, but APC had some minor problems running very old third-party apps.

The m100 is a bargain, and it's easily the toughest unit currently available. Lack of expansion is its only downfall, but at this price you can probably live with that.

Pros Cheap
Tough
Fast
Cons Unexpandable
Some software incompatibility

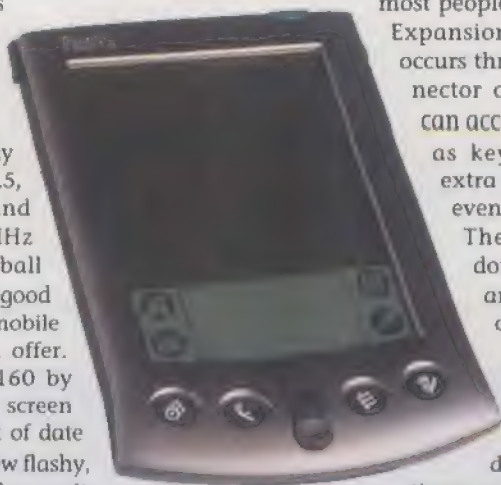
Contact Palm
Phone 1300 360 558
Online www.palm.com
Price \$329

Palm Vx

It's been around for a while, but the Vx still looks good. Slim, sleek and most at home in the executive's suit, the Palm Vx is still the one to beat for smooth rating and value.

With the recently updated Palm OS 3.5, 8M of memory and the faithful 17MHz Motorola Dragonball CPU, the Vx is a good example of what mobile organisers should offer. Admittedly, the 160 by 160 monochrome screen is getting a bit out of date compared to the new flashy, high-resolution, colour units. Also, the Graffiti handwriting recognition system was ground breaking when it was introduced, but it is starting to see some serious competition from much faster and more powerful systems on Windows-based devices.

Nonetheless, as a whole this machine is dramatically better than the specs suggest. The huge array of downloadable programs, the simple four-button



interface and the long-life, lithium ion rechargeable battery would keep most people more than happy. Expansion and connectivity occurs through a special connector on the base, which can accept peripherals such as keyboards, modems, extra battery packs, and even GPS link packages. The HotSync cradle doubles as a charger, and in standard trim, connects to the serial port. The serial port is slower than USB, but it still updates data and downloads applications very quickly, partly due to the compact OS.

The usual contacts, calendar, notes and memo buttons activate the unit and also offer an agenda, secondary menu option or display mode if pressed continuously. One calendar button press for on, two for week, and three for monthly view. The contacts button doubles as a business card beam control if held down, and the up/down scroll buttons enable

contrast adjustment when a button on the top panel is held down.

Other neat touches include ambidextrous use with the flip cover and stylus interchangeable from side to side. Supplied software is pretty thin for the price, with only the Palm Desktop and a conduit into Microsoft Outlook on the standard CD-ROM. The screen is good for text, but don't bother trying to view images, especially with the reverse backlight option enabled. Nonetheless, this is a superb tool within the limits of what it sets out to do. However, a price drop would be nice, especially considering what the m100 offers for half the cost.

Pros Well designed
Fast
Simple to use
Cons A bit dated
Expensive compared to the m100

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Welcome!**

Psion Revo

If you love the Series 7 but can't afford it, there is hope. The Psion Revo offers the same slick keyboard/screen action, the same basic PIM, word processing, spreadsheet and database programs, plus it links to your mobile phone for emails. The fact that it is small enough to fit in your pocket, has a relatively small 480 by 160 monochrome screen and doesn't offer any expansion shouldn't worry you if you consider price.

The biggest drawback to the Revo is its keyboard. It's a full QWERTY layout, but has very close spacing, and even more importantly, it has extremely small travel. Consequently, it's often hard to know if you've hit the right key unless you look at the screen.

Inside the stylish dark blue and silver case lies a 36MHz ARM710 chip, 8M each of RAM and ROM, a built-in squeaker (speaker would be too generous), a neat stylus, an IrDA window, and a bottom-mounted synchronisation port for connection to the host PC. This docks with a special tray-like cradle, and links to the



same PsiWIN utility the Series 7 uses. A power-in socket is used for charging the internal lithium ion batteries that are good for about one week's work.

The Revo is slightly slower than the Palm when paging through entries or applications, and the tiny yet perfectly formed icons can get a little confusing due to their close proximity, but the combination of keyboard and touchscreen make it easy to use. The ROM-based email program handles SMS messages to a com-

patible mobile, using the infra-red window to exchange data. The IrDA port also comes in very handy if you want to print while on the move. A direct wireless print option is incorporated into the OS. Other useful elements are the ability to link and synchronise directly into Microsoft Outlook, Organiser, Schedule+ and other PIMs, as well as exchange directory entries with a mobile phone.

Taken as a whole, the Revo is a really good pocket device with lots of features. Only the keyboard lets it down, with its cheap feel and impractical spacing. However, if you hate Graffiti and Transcriber, this is definitely the best value QWERTY-based manager.

- | | |
|-------------|--------------------------------------|
| Pros | Inexpensive compared to the Series 7 |
| | Easy to use |
| | Looks good |
| Cons | Poor keyboard |
| | Interface a little cluttered |

Contact Vodafone
Phone (02) 9415 7000
Online www.pSION.com
Price \$787

Psion Series 7

The Psion Series 7 is the executive flagship of the Psion range, with leather inlays, a superbly readable colour screen, a fully typable keyboard and plenty of expansion.

The unit has the usual Psion clamshell hinge that allows the screen to angle and sit forward at the same time. This is much more stable than the usual arrangement, yet still keeps the whole casing down to around A5 size.

Inside is an Intel StrongARM 1100 running at 132MHz, with 16M of RAM catering for data. The Series 7 also uses both PC Card and CF Type II expansion slots on the left and right sides, plus an IrDA window on the back. Psion claims the lithium ion battery lasts eight hours, which will keep most people going for two to three days without charging.

No modem is included, although a blanking plate suggests other markets may have one fitted. Like the Revo and the Ericsson, the Series 7 uses the Symbian EPOC OS which offers top quality display and menuing on the colour screen that is easily the best of its kind. Fast operation, simple yet capable menus and input options, plus an easy-to-use



mix of keyboard and touchscreen input make the whole machine a delight to use. The only gripe is the weird triangular stylus — but that's being picky.

Almost all functions are accessible through icons surrounding the screen. This sounds fiddly, but works very well. The applications that come with it are the best of the breed, including word processing, spreadsheets, graphing, databases, sketching, jotter and Web browsing. All

are highly compatible with desktop variants from major names such as Microsoft, Lotus, Corel, Borland and FoxPro.

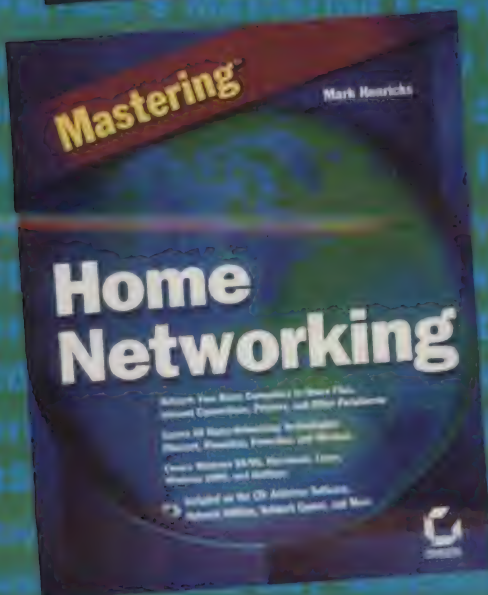
The unit comes complete with a serial link cable for synchronising and a power supply. The PsiWin2 CD is curiously labelled for the Series 5 units, but works fine with the 7. However, extra applications are only demo versions, which is disappointing when compared to the software provided with some Pocket PCs. Synchronising can be automatic or drag-and-drop with automatic file translation.

The only real complaint against the Psion is its price, which puts it firmly into the executive bracket. Perhaps this explains the leather inlay.

- | | |
|-------------|---------------------|
| Pros | Well put together |
| | Easy to use |
| | Expandable |
| Cons | Extremely expensive |

Contact Vodafone
Phone (02) 9415 7000
Online www.pSION.com
Price \$1,964

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Ph: (03) 9662 4699

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Ph: (02) 9235 0155



Royal daVinci

The Royal daVinci was a viable and cheap alternative to the Palms when it came out a couple of years ago. Since then, the world has moved on, but the daVinci hasn't.

The screen is dimly reminiscent of the first PalmPilots, navigation is slow compared to the new wave of speed demons, and the screen menus and icons are chunky and hard to discern. Worst of all, nobody has written any third-party software for it.

It's a shame, because for the money, you get quite a capable device. With a slightly better screen and some tweaks to the OS and interface, it would still be in contention.

The buttons on the case are used only for horizontal and



vertical scrolling as the applications are accessed through touchscreen icons, rather than hot start buttons. A backlight comes on when you hold the power button down, but it's so dim you can hardly tell it's on.

Applications preloaded in the 2M of memory are phone, to-do, planner/calendar, notes, calculator and utilities such as defragment and synchronisation. You can also scribble diagrams and the like on the screen, but these don't port into anything on the host PC, so are pretty much a waste of time.

Data is entered through a proprietary daVinci script recognition module. This is about as good as Grafitti, and workable enough. A pop-up virtual keyboard is also available if you just can't get the squiggles right.

Entering details into the applications is

nowhere near as easy as it is in Palm or Pocket PC. Instead, you have to navigate through a number of icons and menus on different parts of the screen for news, tools, type and eventually data entry.

The synchronisation cable plugs into a slot on the base and synchronises with a 'PIM for daVinci' application through the serial port. Power is supplied by two AAA batteries that seem to last about four weeks. No infra-red window is included, and no modem or mail sync are available either. This all makes the daVinci rather limited in comparison to today's expandable devices. It doesn't cost much, but it doesn't do much.

Pros Cheap

Cons No connectivity

Little third-party software

Slow

Contact Royal

Phone (03) 9853 9388

Online www.davinci.com

Price \$199

TRG Pro

US company TRG Products has rebadged the Palm IIIx as the TRG Pro. It sells for \$699, complete with 8M of RAM, and a new high-resolution monochrome screen. TRG has also done what Palm is about to do and incorporated memory expansion into the Pro.

On the top edge, just below the infra-red window, is a cover that opens up to reveal a Type II CompactFlash (CF) socket. The CF card slot is complemented by a bigger, amplified speaker on the back panel, and an additional volume control icon. All these extras are fitted in without making the unit any thicker or heavier than standard.

The power for the 16MHz Dragonball chip comes from two standard AAA alkalines, which run for about four weeks if no CF card is fitted or accessed. Doing so will shorten battery life noticeably, especially if modem or network CF



cards are used. The controls are identical to the Palm IIIc, with four button on/function controls plus a scroll toggle rocker. A power switch doubles as a backlight control, and contrast is controlled by a tiny side-mounted thumb wheel which is absurdly easy to knock when putting the unit away, resulting in a completely black screen on next power-up and ensuing panic.

The 160 by 160 screen is a definite improvement on the early Palm III, both indoors and in sunlight.

Used on a pair of data

entry windows under the screen, the stylus sits in a slot on the back. Data entry with Grafitti (or through the pop-up virtual keyboard) is easy, if a bit tedious.

Curiously, the new Agenda view was not included on the applications list. Burned into ROM are CF backup, CF Pro and FlashPro applications for copying, storing and arranging files on a CF card if used. The OS has also been tweaked to allow playback of WAV files, recognition of modems and other CF cards. WAVs can't be synchronised and have to be loaded onto the CF card externally.

This is a very neat and expandable device. Why Palm didn't market it is a real mystery.

Pros Expandability

Easy to use

Inexpensive

Cons Based on an older Palm

Contact Advanced Portable Technologies

Phone (02) 9906 3800

Online www.trgpro.com

Price \$699

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ASUS

www.asus.com.tw

Vadem Clio

Vadem has certainly taken a different route from most. The Clio looks like a notebook when closed, but the clever three-way hinge mechanism allows it to work in three ways: like a standard keyboard-driven notebook, a flat tablet pen-driven device, or a free-standing presentation unit.

The 256-colour screen is one of the best of the CE bunch, with effective brightness and contrast adjustments, extremely wide-angle adjustment and a touch-sensitive layer across the whole working area. This is complemented by the slightly smaller than normal keyboard, set on an angle across the front of the base.

The left side of the base holds sockets for the 56K modem line in, synchronisation serial connection and power in, and the right side has a PC Card slot and the IrDA window. The tubular lithium ion battery sits right across the back of the unit, and Vadem claims it provides 10 hours of continuous life (APC certainly had several days' average use before a charge was needed).

Curiously, the unit doesn't auto-off when the screen is folded, which is a serious omission. Removing the battery exposes a



vacant Type II CompactFlash slot that is very tricky to access.

The Clio uses a 90MHz NEC chip running with 16M of RAM, the usual instant-on facility and a range of Windows CE applications including Microsoft PowerPoint, Word, Excel, Access and Calligrapher text recognition, in addition to

the standard PIM applets. A built-in voice recorder and speaker complete the hardware. Software on the CD includes a few printing, faxing and note-taking applications, but nothing very exciting.

The Clio is a treat to use. The tough metal hinge gives an air of solidity and the touchscreen makes CE so much easier to use than the Pocket PC devices. The keyboard is more than good enough to touch type on and, combined with the neat stylus, data entry is fast and effective. Syncing is rapid using ActiveSync 3.0, but some files need to be converted during the process, and may lose formatting while porting to native Pocket style. This durable and versatile notebook alternative is worth a look if you don't mind the price.

- Pros** Great screen
Plenty of features
Tough
- Cons** The most expensive device reviewed here

Contact Organiser King
Phone (03) 9696 3366
Online www.vadem.com
Price \$2,350

EDITOR'S CHOICE
Australian
Personal
Computer

Compaq iPaq H3000

Highly commended
Palm m100

Change is taking place in the handheld market. Function and looks are becoming more important than speeds and feeds. As a result, the Compaq iPaq and Palm m100 come in ahead of the pack, although they're



diametrically opposed in terms of target market. The first is supremely powerful, expandable and costly, while the m100 is the most accessible mobile manager yet produced.



However, it was a hard call rating them ahead of the Motorola Accompli which, if it gets more software and memory capability, could surprise everybody in the near future.

BONK!

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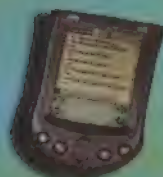


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Harvey Norman

Call waiti



*Net telephony appeared a few years ago with a fanfare as suppliers pushed the concept of free voice calls to anywhere in the world. Then the hype evaporated. **Alex Kidman** examines the options locally available.*



mg

Net telephony was once expected to become the top Internet application, and companies invested heavily in ventures aimed at cheap telephony. The market for these applications, aimed at home users, has stalled since then. OzEmail's Internet Phone came and went, and at the time of writing had just relaunched as a free service through a@zconnect.com — too late for this review. APC took a look at the new generation of applications, based around PC-to-PC conversation, which has sprung up.

Business telephony

At present, voice over IP is very attractive to the business market. There are considerable savings to be made by using existing IP structures instead of expensive PSTN (public switched telephone network) equipment. However, for the home user there are few local options. The full version of Netscape Communicator has an application called Net2Phone which offers PC-to-phone calling, and is theoretically available to Australian users. However, APC had trouble registering for it. Over the period of a week, we were constantly met with dead servers, browser errors and crashing applets, which made using it impossible.

PC to PC and PC to phone

There are two main kinds of services. First, you can speak PC to PC using the same software on both systems. Users locate each other through IP or a directory system provided by the software. The other type of connection is where people make calls from their PCs to standard phones. Most of these services limit the areas you can call (wherever the service provider has a Net-to-PSTN gateway), but at least the person on the other end doesn't have to be using the same software.

Voice quality over IP is like a weak mobile phone connection; in all our testing we never got an error-free connection. If you can stand bad connections, then you'll find Net telephony acceptable. If you must have crystal clear reception, stick to the paid alternatives.

In contrast, contacting a telephone involves interfacing an IP connection with a PSTN connection, and normally you can't do this for free. US services promise 'cut-rate' local and international calls through the Net, but few accept international customers. The PC-to-phone software applications APC reviewed mainly rely on running ad banners and taking demographic information for making money. If you can live with this, you'll make significant savings with Net applications, especially if you make many international calls.

How we tested

All testing was done using two dialup modem connections. Both systems used 56K modems, but one of our phone lines never connected above 26,600Kbps. This helped to identify those products that can handle both a disparity in IP speeds and a low-quality connection. PC-to-PC products were tested with calls to and from both connections. As individual hearing can vary, the two testers swapped connections (which were in separate rooms) frequently. For the applications that use phone connections, calls were placed to the UK, Singapore and the US. Also factored into the testing were any other applications that came with the PC-to-PC software, such as digital whiteboards, file sharing and video camera capabilities.

Dialpad

Dialpad is a Java-based application that runs within a Web browser. Unlike the very similar ISIS Phone4Free, it runs as well in Netscape Navigator as it does in Internet Explorer. It is limited to calls to standard telephones within the US, and PC-to-PC conversations internationally.



This isn't a complex piece of software. When you create an account, you get an address book (for US numbers and other Dialpad users) and that's about it. The actual dialling interface supports a number of skins, but there's no capacity for users to create their own.

Dialpad topped our tests for overall voice quality. It beat Phone4Free and Microsoft NetMeeting by a small margin with very few voice faults on PC-to-PC calls or international ones. Occasionally, the voice quality dipped a little while an ad was loading, but aside from this it was reasonably crisp. We were able to dial Las Vegas, enquire about room rates and get a clear response. A call to a pub in Dallas, Texas, got a similar response, albeit from an answering machine.

The application's Java base suggests

that Dialpad should work acceptably for Mac and Linux users, but APC was unable to test this. This would make Dialpad unique among the products we looked at.

Dialpad's Web page promises that international calls will be available through its service 'soon'. When they are, it'll provide Phone4Free with a real challenge.

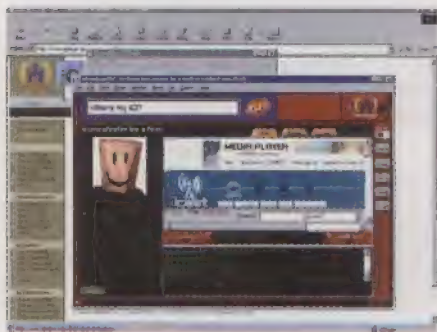
Pros Great voice quality
Simple interface
Cons 'International' = US

Contact Dialpad
Phone N/A
Online www.dialpad.com
Price Free

Mplayer Chat/Hear Me

Mplayer uses its client mainly for online multiplayer gaming, but it also has a text-based chat client, as well as a voice client, supplied through Hear Me.

To install the client, you must sign up



for the Mplayer service. During testing, this was quite frustrating, because both test machines' response times from Mplayer were slow. When we finally downloaded the client, we could join a variety of chat lobbies. Like some of the other chat clients APC looked at, Mplayer is keen to promote the idea of community. To do any chatting you must first join a chat lobby, and topics range from teen chat to over-50 romantic chat. To actually chat, you must join a room, so we quickly established a private room for testing purposes.

The voice capability of Mplayer Chat is very poor. To chat, you just press and hold the onscreen talk button, and then talk. There's no capacity for duplexing, and sound quality was awful; it was often hard to make out what the other person was

saying. We quickly defaulted to using the complementary text client, as it was faster and far more comprehensible.

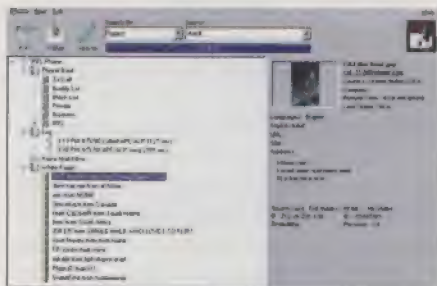
Mplayer provides some great services to the gaming community, but chat isn't one of them.

Pros Multifunction client
Community atmosphere
Cons Terrible voice quality
Convolved logon procedure

Contact Mplayer
Phone N/A
Online www.mplayer.com/chat
Price Free

IRIS Phone

IRIS Phone represents a genuine attempt to set up a community of users and provides PC-to-PC calls from within the IRIS Phone community. You must be signed up and you can only be contacted through



your username. Individual IP addresses aren't available, which is good if you can't be bothered finding out your own IP, but it does leave you open to nuisance calls.

Apart from the usual name and email address requirements, you must also specify interest areas. The purpose of this is to get people with common interests together, although in our testing we found that a lot of people have picked every option so that they appear as often as possible. You can't appear invisibly on IRIS Phone; if someone searches for you by language spoken or interests, you'll show up and can be called.

The main problem with IRIS Phone is voice quality; it was below par in our tests. This is partly due to the fact that IRIS' base of operations is in the US. In order to call

from one room to another in APC Labs, the data had to travel through IRIS servers first. As in Microsoft NetMeeting, conferences, shared whiteboards and video chat are available, but considering a few of the default images people presented, we're not sure you'd want to chat to some of them.

IRIS Phone makes a good effort at creating an online chat community, but fails badly in terms of voice quality.

Pros Great interface
Community atmosphere
Cons Poor quality voice chat

Contact IRIS
Phone N/A
Online www.irisphone.com
Price Free

All these listings can be found on this month's cover CD.

EEK!



Aaah...



Introducing the 3M Renaissance™ Mouse

Unlike the conventional "palm down" posture of most mouse input devices, the "handshake" design of the 3M Renaissance Mouse has been clinically proven to reduce muscle strain and fatigue associated with mousing and PC use.

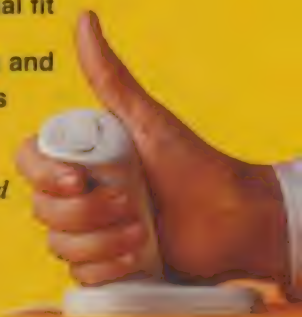
With its patented vertical grip, the 3M Renaissance Mouse keeps your arm in a more natural, neutral position. This means you use your large arm muscles rather than small finger muscles - a key ergonomic principle - which places significantly less pressure on your wrist's median nerve.

The result is a more comfortable movement and a reduced chance of disorders of the hand, wrist, forearm or shoulder associated with mousing.

Features include:

- Left and right click functions using the thumb button on the top of the vertical grip
- Easy single click electronic scrolling function
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3M Innovation

ISIS Phone4Free

Phone4Free promises the world — and comes very close to delivering it. It's a Java and browser-based telephony option, allowing PC to phone calls to 30 countries.

The service is US based (although ISIS is a local company), so to call locally, you



need to pick the correct country and area codes. Calls went through reasonably well, but there was a constant background buzz. This put voice quality at about the middle of the range.

One problem with Phone4Free is that it wouldn't run under Navigator, preferring to crash the browser. Another problem is that the interface allows you to clear the dial window, presumably so you can make another call, but doing so had no effect. In order to make additional calls, it was necessary to close the browser window and log on again.

APC tested the international calls service by dialling the UK. Voice quality was good for the most part, with occasional echoes and distortion, but if you make lots of international calls, you'll know that's par for the course. The service was launched only a

week before we tested, so it'll be interesting to see how the servers handle more people using it for regular calls in the future.

Phone4Free provides a good service, and being free, we're all in favour of it. It doesn't have the same voice quality as Dialpad, but it has a broader range of calling options.

- Pros** Free international calls
Simple interface
- Cons** Need to log on for each call
Voice quality could be better

Contact ISIS
Phone N/A
Online phone4free.isis3.com
Price Free

Microsoft NetMeeting

NetMeeting is more about business conferencing than telephony. You can share files, applications and a whiteboard. It only offers a low level of voice communication (supporting PC-to-PC communications), but is still an excellent tool. However, its rather stark interface could confuse beginners.

All connections with NetMeeting are made through IP addresses, rather than the directory system used by some



other products, but it's possible to connect to Microsoft's directory services to track people down.

Voice quality with NetMeeting was excellent, but so it should be, as direct IP connections involve no intermediary to compromise the quality of the signal. On APC's modem connections, the voice quality was affected more by the microphone quality than by NetMeeting's compression algorithms. The overall result was better than the average mobile phone call, although single-second delays were noticeable if we spoke too quickly. Using IP to connect can be a bit of a pain on a dialup connection; as well as having to find out your IP address

every time you log on, you have to type in long IP codes to place your 'call'.

As long as you can find out your own IP address and that of the person you want to call, you should have no problems with NetMeeting.

- Pros** Clear audio quality
Ability to share video, files and applications
- Cons** Windows only
Stark interface may confuse

Contact Microsoft
Phone N/A
Online www.microsoft.com/netmeeting
Price Free

Phonefree

Phonefree allows PC-to-PC calls and free calls within the US to landline phones. As you need to be based in the US to call the US, Australians can't make use of the PC-to-phone function, so we were confined to assessing Phonefree's PC-to-PC perfor-



mance. Voice quality was good overall, but there was some echo, especially when both parties spoke at the same time.

The application is well laid out, but almost every function on the dialing pad launches a separate browser window. At the end of one test conversation both participants had eight different windows open.

Phonefree has other functions linked to its Virtual Calling Card service, which is basically an address book for recording the details of Phonefree users. Setting up virtual cards was a bit of a chore. After setting them up through a separate browser window, it took two relaunches of the client program before the details would show up. Without a calling card, you have to use the client number, which is inconvenient.

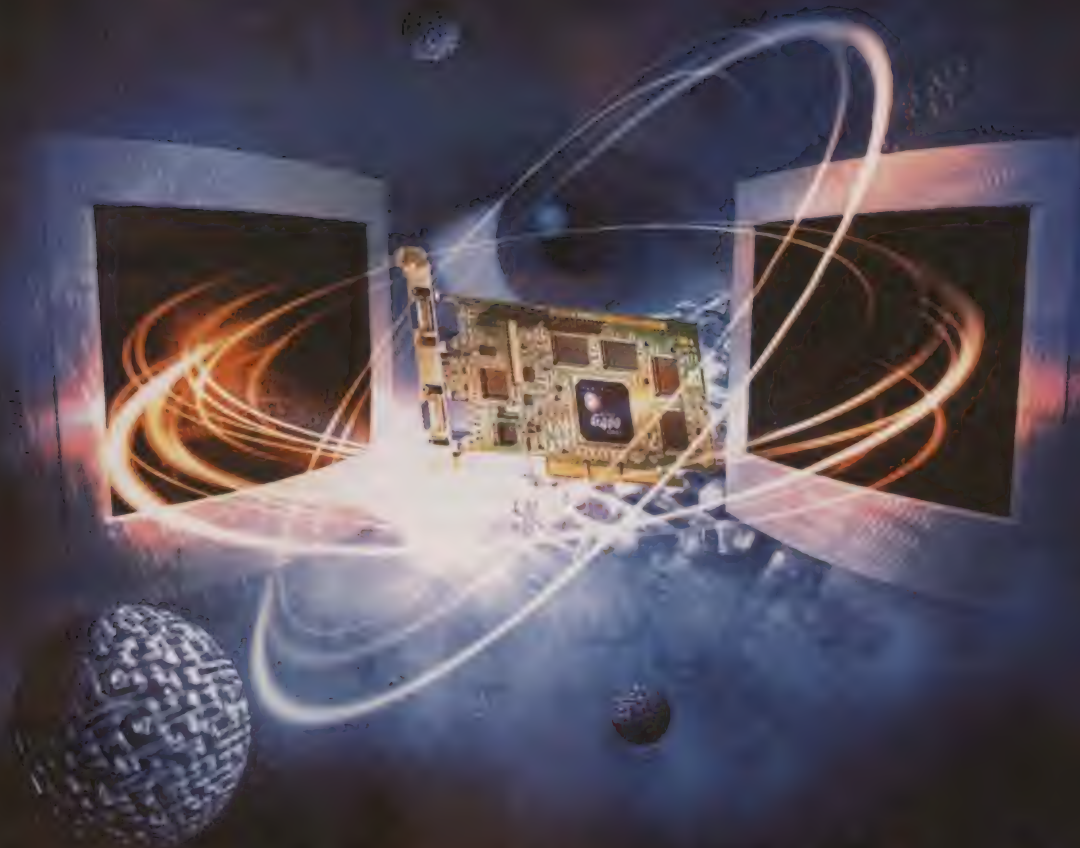
Phonefree also supplies teleconferencing facilities, most notably video chat

(for those with cameras) and a file transfer utility.

Phonefree is a robust application with acceptable voice quality. It doesn't have the attention-grabbing features of some of the other software we looked at, but it's still a good program.

- Pros** Good voice quality
Good interface
- Cons** Launches millions of browser windows
Phone dialling only works within the US

Contact Phonefree
Phone N/A
Online www.phonefree.com
Price Free



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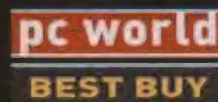
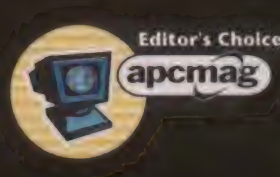
The Sharpest

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- ▶ 300 or 360 MHz UltraSharp DAC for flicker-free displays

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Netspeak Webphone

If you're after a Net telephony application that actually looks like a phone, Webphone could be the utility for you. It's a PC-to-PC application with an interface reminiscent of very old mobile phones. The basic version of Webphone is time limited to three minutes. If you want longer talk times, you need to pay for the program. You'll also get conference calls, voicemail boxes and other business-friendly options.

Voice quality was acceptable, but not exceptional. We were rather hampered by its time limitation, but managed to be understood most of the time. Webphone suffered more than most applications on our poorer-quality connection.



One feature Webphone has that puts it ahead of the pack is the ability to run multiple lines by putting the person on the line on hold while you chat to someone else on another. The catch? The interface supports it, but you need to pay for the full program to activate it.

Webphone also lists other users on the service, but we never found more than about 30 users logged on at once. If you choose to list yourself (there is an option not to be listed) be ready for some interesting calls. During one call, both testers were interrupted by callers who located us by selecting 'all countries' in the search dialog.

Pros Simple interface

Lots of features

Cons Average sound quality

Why pay for utilities that can be had free?

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Online www.webphone.com

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As you can get similar features out of software such as NetMeeting for free, Webphone is an unlikely first choice.



ISIS Phone4Free

Highly commended

Microsoft NetMeeting

Phone4Free offers the best of Net phone calls — free. It didn't have the absolute best voice quality, but it was more than acceptable for most purposes. How long can this free service last? Who knows, but in the meantime, we are more than happy with it.

NetMeeting has great sound quality, and a simple interface that manages to pack in a lot of options, especially for those who are keen to teleconference.

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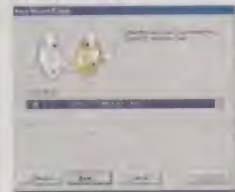
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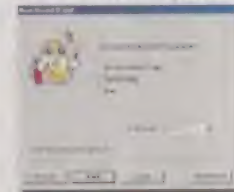
1. Just select the "Copy a CD" option



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3. Finally click on the "Test and burn" option



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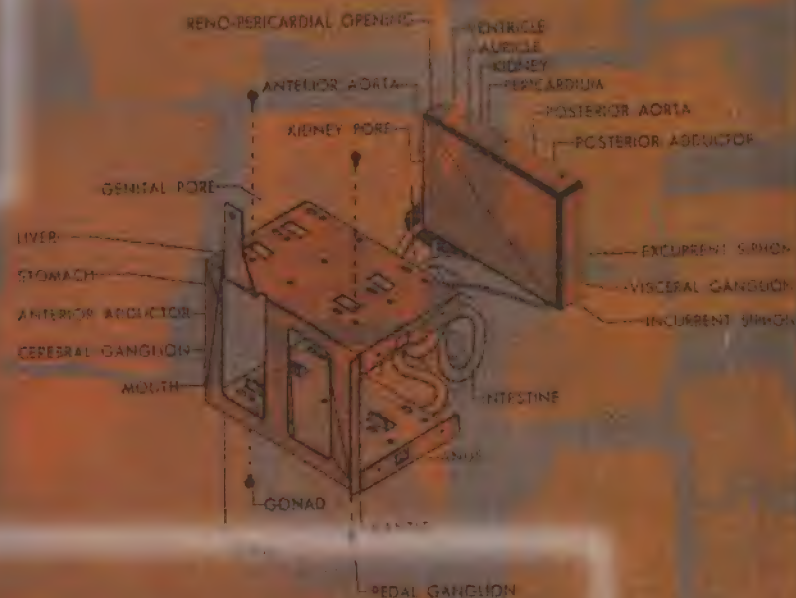


Illustration by: Warren Taylor

GETTING smaller

*Hard disk drives are now capable of storing more data than ever before, but magnetic disk technology is about to reach its limit. What is this limit, and is there anything else that can be used? **Darren Ellis** investigates.*

There is an old Chinese tale about a peasant who is the only person capable of rescuing the emperor's daughter. The emperor agrees to reward the man who rescues her with anything he desires. The peasant points to a chessboard, and tells the emperor that he wants one grain of rice for the first square of the chessboard, two for the next square, four for the one after that and so on, doubling the number of rice grains each time until all the squares are filled.

Thinking the man a fool, the emperor agrees to his request and the peasant duly saves the princess. The emperor soon understands the magnitude of the peasant's request: there is not enough rice in all of China to pay him (by the 64th square, the accumulated rice grains numbered 9,223,372,036,854,775,809).

Hard disk storage capacity seems to be increasing at a similarly fantastic rate. The current silicon chip capacity doubles every 18 months, and there has been a similar trend with magnetic hard drives. In the early '80s, capacity increased by about 25% to 30% every 12 months. In the '90s, this rate doubled, and each successive year produced hard drives 60% larger than the last. Now, capacity increases have reached a staggering 130% a year.

Eventually, something has to give. To understand why, it helps to understand how a hard drive works.

The anatomy of a hard drive

A hard drive consists of two main groups of parts. First, there are the drive platters. These are made from an alloy or plastic, coated with a magnetic material and further protective layers. The platters are stacked and spun at 3,600; 5,400; 7,200 or 10,000rpm.

The second are the read/write heads. They are used to read and write the data from and to the platters. A mechanical arm

positions the heads over the platter. They 'fly' over it at so small a distance from the platter surface that to the naked eye it appears they are touching it. A magnetic disk works as pure binary: the magnetic particles on the platters are in two states, either positive or negative. The write heads change the magnetic polarity of the particles on the platter for each bit of data, and the read heads read the magnetic alignment of those particles to determine what is written there.

IBM produced the first magnetic hard disk, RAMAC, in the 1950s. It was capable of storing 5 million characters (these were 7-bit characters, not 8-bit bytes) on 50 huge aluminium disks. Since then, the capacity of the hard drive has increased by a factor of 3 million. Improvements have included thinner platters and diminishing read/write head flight heights. Hard disks are faster and more accurate due to advances in recording media and increases in head sensitivity. These have also provided incredible capacity gains.

The giant magneto-resistive head (GMR), a successor to the magneto-resistive (MR) head technology, represents the latest advance in magnetic hard drives. MR and GMR heads exploit effects that have been known for a decade, but it has taken a while to work out exactly how to make use of them in hard disks.

MR heads measure the changes in the magnetic resistance of a bit on a hard disk. They have been used in drives for the past few years and are more sensitive than older heads. A GMR head senses resistance change in the magnetic material by measuring the quantum nature of electrons, and how well they tunnel through the material. Something similar is used in scanning tunnel microscopy (described below).

Beyond a certain point, the miniaturisation of magnetic material creates problems. In approaching infinitesimal sizes, something called the superparamagnetic effect (SPE) is produced.

Under-attraction

SPE is produced when the size of magnetic bits on a hard drive is scaled down. If the bits get too small, the ability of the magnetic grains to hold a magnetic field at certain temperatures is weakened. The polarity can change due to the interference of phonons and magnons, which means the bits on your hard drive start flipping from positive to negative, or vice versa. That's major data corruption, and once it starts it gets worse.

The superparamagnetic limit is a theoretical one. No one knows for sure when it will be reached, but at the rate hard drives are being developed, it will be soon. It's estimated that when a data areal density of 40 gigabits (Gbits) per square inch is reached, this will constitute the absolute limit of magnetic density. Hard drives with areal densities of 20Gbits per square inch are now hitting the market. They should reach 40Gbits per square inch by 2004.

Should researchers avoid SPE by swapping to a different recording medium, or should they stick to what's currently being used? Swapping involves more than a change in recording material; it also requires changes to the heads used to read and write.

Staying magnetic

Not everyone is convinced that SPE is going to spell the end of magnetic recording so soon. Research by IBM and Fujitsu indicates that magnetic material is here to stay. Fujitsu has shown that areal densities of 56Gbits per square inch (more than the theoretical 40Gbits per square inch SPE limit) are possible. To achieve this, a magnetic recording surface that isn't strictly planar (it has depth) is used. Currently, this multilayer recording technique is capable of supporting an areal density of 100Gbits per square inch, but it will be a while before products developed from this technology are available.

Earlier this year, IBM researchers created 'self-assembling' magnetic materials that might be able to support up to 100 times more data than current materials. Using chemistry and nanotechnology, they were able to make the materials (a combination of iron and platinum) arrange themselves into uniform patterns. These materials are smaller than current magnetic materials and can hold their magnetic charge at room temperature. However, IBM must now develop a head that can read the data fast enough.

Using magnetics with optics

Magneto-optical (MO) technology is a way of combining magnetic and optical functions into the read/write head and recording material. MO disks are presently used in many removable storage devices.

MO technology is used on harder magnetic material. A laser in the write head heats a spot on the recording surface, effectively 'softening' it, then the magnetic part of the head writes the data. The data is read back through the laser, at faster speeds than magnetic read heads, by using the Kerr effect — the slight distortion of light due to the magnetic bit's polarity.

Solid immersion lenses (SILs) are a much newer variation on MO technology, and not yet available commercially. The use of near-field storage with SILs was developed by Stanford University and is undergoing further development by a business called TeraStor.

SILs work by the same principle as MO, except that they use a technique called liquid-immersion microscopy that increases magnification, but in reverse. The magnifying lens and the material being magnified are immersed in a liquid; it is the lens that increases the magnification effect. This

Memory ahead

The physical limits of photolithographic chip manufacturing are in sight, yet the desire for denser circuitry is still strong. Fortunately, researchers are already perfecting replacement technologies.

The first of Hewlett-Packard's strategies is to improve memory density and lower costs on conventional chips. It is also exploring atomic-level manipulation of data reads and writes. Finally, it is looking at chemically 'growing' circuits instead of etching elements on to silicon.

The first type of memory research is based on Magnetic Random Access Memory (MRAM). This is a hybrid of existing RAM technologies (photo-resistive etched circuits), using magnetic polarity to store data instead of using electrical charge elements to retain positive or negative bits. The characteristics of an element can be altered by applying a voltage, and the magnetic condition of the junction is then retained indefinitely. According to Hewlett-Packard's Advanced Storage Research Centre Manager Jim Brug, MRAM can be read anytime, without needing refresh voltage. Combined with its ability to be packed at very high densities, this makes MRAM a

very attractive replacement for conventional flash and DRAM.

Brug likens MRAM to the oldest form of storage, core memory, which used tiny coils to store on or off states by inducing magnetic orientation as the indicator. MRAM uses the same theory, but uses multilayer silicon circuits laid down in a checkerboard pattern instead. MRAM is only a couple of years away, and should bring very low power requirements as well as high speed to solid state memory.

If MRAM looks good, then ARS (atomic resolution storage) looks even better. Instead of using electric charges to record data, ARS orients the atomic structure of the recording medium. "ARS is a combination of technologies," Brug said. "First, we have to develop a micro-machine capable of delivering a data signal at atomic accuracy. Next there is a kind of super-small DVD technology that can write and re-write data as required on to a modifiable substrate. Lastly there is the platter material itself that we use to store memory, which uses heating and cooling to allow data changes."

If all this sounds complicated, it is. Brug and his team have only produced one

working ARS cell so far, but he maintains that within about four years new technology will be able to store multigigabyte data sets within a chip no larger than an existing DRAM chip.

Despite the use of a movable micro platter, ARS's extremely small size — about 0.2 nanometres across — suggests the memory will be extremely rugged. A specially contoured emitter tip patches data on the substrate by beaming electrons at it. Brug said that, although Hewlett-Packard might not make the chips itself, the key pieces are already in place and it is very likely that ARS will be manufactured in bulk.

Hewlett-Packard Labs' Phil Kuekes and his team are working on breeding computer chips. They've already 'grown' molecular-level switches and connecting wires from special chemical compounds. This means that wiring no more than one molecule in diameter can be laid down. Kuekes' aim is to produce 'integrated circuits in a beaker', which can then be 'loaded' with programs specific to their function. These chemical ICs will be so cheap and small that they can be tested for accuracy and given programmed workarounds to correct any faults.

Jeremy Torr

allows the laser to write to incredibly small bits: about the size of one micron. It's called near-field storage because the distance between the surface and the write head is smaller than the wavelength of the laser.

There are no SIL-based storage products available yet, but TeraStor hopes to have something out by the end of the year. Current demonstration drives have a capacity of 20G, but it is believed that capacities of 200G or more are attainable.

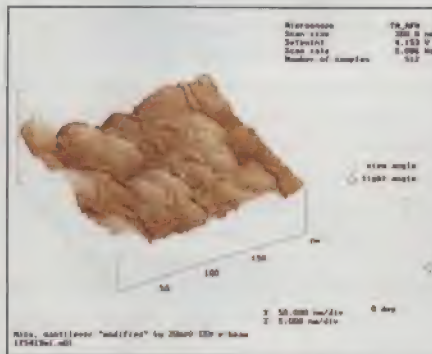
Holographic data storage

Holographic storage is an interesting approach to data storage. The white-light holograms we are familiar with record a 3D image on a 2D plane. Research labs worldwide are researching ways to record digital data in these same three dimensions.

Holograms are created by recording the differences made by two intersecting beams of light: the object beam and the reference beam. For a conventional hologram, the object beam is shone onto the surface of the item being photographed. This causes the object beam to distort according to the topology and refraction index of the item, and the differences are picked up when the reference beam (of the same intensity and strength as the original beam) intersects the

object beam within the recording medium.

The same process is used with holographic data storage, except that the object beam is modified according to the data that is to be recorded. This modification can take place by pulsing the object beam or by passing it through a spatial-light modulator (SLM).



▲ The surface of mica showing the incredible detail that AFM can achieve. Each 'hill' is a few microns high.

An SLM is essentially a 2D 'checker-board' system, which blocks light on some bits and allows it to pass through on others, representing chunks of bits through pages.

The object beam intersects the reference beam within the recording medium.

The data gets written either as a change to the refractive index of the medium, to the thickness of the medium, or to the light absorption properties of the medium. The interference pattern in the object beam is what is actually recorded on the medium.

To read the data back, a reference beam is fired to the written track. This recreates the object beam, which is picked up by a CCD camera which then reads what is written.

Early indications, including demonstrations last year, show that read data rates are about a billion bits per second, with the slowest seek times for random data at about 100 microseconds (these rates should improve as development continues). This is faster than any hard drive currently available.

Many pages of data can be stored within the same area of the recording medium by changing the angle of the laser beams or modulating the laser wavelengths. Researchers' projections suggest that holographic data can store trillions of bytes on a recording device the same size as a CD, or in a cubic crystal measuring a centimeter on each side. A recent article by Laser Focus World cites holographic storage statistics of transfer rates of one terabit per second, and areal densities of 100,000 bits per micrometer cube (compared to optical storage's one

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bit per micrometer cube and magnetic disk's eight bits per micrometer cube).

Researchers have made great progress on this technology, but there are still some major obstacles in the way. They do not have a reliable recording medium yet — one that is stable at room temperature, has high optical qualities and suitable areal density.

Drilling on atomic levels

Two technologies that have been explored as possible storage methods use what is called scanning probe microscopy — the study of surfaces at infinitesimal scales. Atomic-force microscopy (AFM) and scanning tunnel microscopy (STM) are technologies that can affect matter at an atomic level. Imagine a single magnetic grain from a hard drive. This is a single grain from a group of grains that make up a single bit on a hard disk. Now imagine something reading and writing thousands of bits of data on to the side of that single grain. This is the scale on which scanning probe microscopy operates.

STM was originally developed to map the surface morphology of objects at the atomic level. It requires an extremely small, sharp tip with an electrical current running


through it. The closer the tip is to the surface, the faster the current flows, and by measuring the piezoelectric forces of the medium, a surface map can be built. For the purposes of data storage, both the tip and the surface must be good conductors.

Further developments to the STM tip have meant that the atoms themselves could be manipulated (or written) and the placement of these atoms read. Here, atoms are used to represent the digits 1 and 0 (a present atom represents 1, an absent atom represents 0). IBM researchers successfully carried out STM writing when they made news around the world by writing 'IBM' in xenon atoms with an extremely low temperature STM. Because data is being written with atoms, areal densities of millions of gigabits per square inch are possible.

AFM is similar to STM, but it requires contact between the tip and the surface. The tip of the atomic-force microscope is small, although it is not as fine as the STM tip. It is positioned on a cantilever and brushes against the surface of the recording medium, registering the curves of the surface in tiny distances. The force exerted back against the tip as it traverses the surface is so small that the term 'atomic force' applies. The tip does not damage the surface.

This is how AFM reads data, but to write data the tip is heated up, melting the plastic substrate of the recording surface and leaving an indentation. This is called thermomechanical writing. AFM and STM require different recording media. Because the storage capacity of AFM is not as limited as STM, the read and write conditions aren't as stringent. AFM can work well at room temperature, but STM requires particular conditions to function properly.

IBM researchers have manufactured a storage device called the Millipede. Using AFM tips in a 32 by 32 array (1,024 tips in a 3 by 3mm area) information can be read and written onto a plastic surface on silicon cards. This reinvention of the punch card can store information as densely as 500Gbits per square inch.

In *Tech Review*, George Whitesides, Professor of Chemistry at Harvard University, has speculated that due to the minute scale on which data storage may soon be possible, an object the size of a wristwatch could eventually store significant portions of information used in daily life, circumventing the need to learn it. Clearly, advances in storage technology could reshape our lives in unpredictable ways. 

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The outsourcing dilemma

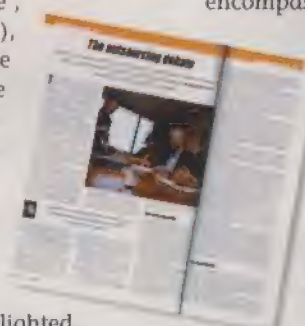
It's a popular strategy for controlling costs and minimising staffing problems, but outsourcing is proving to be increasingly controversial. As foreshadowed in Corporate IT last month (see 'The outsourcing debate', APC October, page 128), an investigation by the Auditor-General into the government's outsourcing program has been highly critical of many aspects of the plan. A detailed report on this can be found in News-wire, page 22.

The investigation highlighted many problems with the government's outsourcing arrangements, including a decline in service levels and problems with the production of invoices by the companies that won the outsourcing contracts. However, the most arresting conclusion was that many government departments are actually worse off under the new

arrangements than they were when they managed their own IT.

It's not entirely surprising that many aspects of the outsourcing program have proved troublesome. No project that encompasses so many departments and desired outcomes could be pulled off without, at the very least, some teething troubles. However, the fundamental goal of this outsourcing program — cost savings — wasn't achieved. This highlights the risks involved when IT is moved outside the immediate control of your business.

The most obvious lesson for other companies considering outsourcing is to plan meticulously, and to allow sufficient time to do so. It's also important to think carefully before accepting the lowest up-front quote. If a cheap deal fails to deliver on key business metrics, then the final cost could be a lot higher.



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Patch Panel

The Patch Panel section on CD 1 of APC's cover CD pack includes the latest patches and updates for a wide range of operating systems and applications. Check page 13 for details.

This month's buzzword: reverse portal

Why do we need this term?

The term 'portal' is massively overused, and is applied to just about any site that contains content from more than one source. It has also prompted a range of spin-off terms, vortal or vertical portal being the most common. The concept of the 'reverse portal' is yet another version that has quickly become a meaningless catchphrase.

What does it mean?

That depends on who you ask. It has a specialised meaning in medical terminology, but in relation to the Internet, 'reverse portal' usually refers to a site which draws information together (like a conventional portal), and then distributes it directly to individual users, rather than pulling it together from multiple sources in the fashion of a conventional portal such as Yahoo.

For instance, someone with a WAP-enabled mobile phone might receive data updates from a reverse portal service, but won't see them in one conglomerate location; instead, data

will be sent on a schedule determined by users. Basically, it's an attempt to revive the 'push technology' concept, which enjoyed a brief vogue in the late 1990s before everyone realised that email was a more effective push medium.

The term is also used to describe the creation of a portal site as an accidental by-product of creating a family of specialised sites. For instance, if you were to develop a group of independent specialised sites with information on plumbers in every town in Australia, each using a URL of the form townname.plumberplace.com, then the main plumberplace.com site could be defined as a reverse portal.

Where should I use it?

Use this term when explaining to someone how you're redefining your company Web strategy to line up with the emerging trend for information access on a range of devices and in a variety of formats. Trust us, this will work.





Illustration by: Warren Taylor

Get back to work

*The Internet is being blamed for taking our minds off work and turning us into a nation of cyberbludgers. Employers are angry, but **Fiona Williams** asks, who is really to blame?*

Increasing numbers of Australians have Internet access at work and for many, the temptation to indulge in personal Web surfing behind the boss's back is too strong to resist. Think about it from the employee's point of view: you can check the latest sports results, send emails to friends to plan your weekend or shop around for holiday destinations, and the best part is that you look like you are hard at work, typing away at your PC.

Employers have tended to turn a blind eye to the occasional visit to a site that is not related to work, provided these diver-

sions are harmless and brief, and the work gets done. However, a brief distraction is one thing; chronic time wasting is another. It's the latter that has employers in a tizz about how to combat the latest threat to productivity: cyberbludging.

"An office full of people perched in front of their computers can all look like they are working even if they are logging onto sports, news, gambling or adult sites," said Martino Corbelli, marketing manager of cybersurveillance software SurfControl. "This is a problem for every organisation that provides Internet

access to any of its staff. The costs can be up to 12.5% of the average salary budget, which in many instances is an annual cost in the millions."

Perth-based information technology company Livingstone Group puts the overall cost of cyberbludging at \$1 billion per year in lost productivity in Australia alone. Analyst group Angus Reid has determined that 26% of corporate traffic in Canada is unrelated to work. It is a worldwide problem that is expected to worsen in the near future, as 272 million employees around the world are predicted

to have Internet access by 2003. That's an awful lot of prospective cyberbludgers.

Another potential side effect of cyberbludging is a high turnover of staff, brought about by the prevalence of online employment sites. More job vacancies are advertised on online employment sites than in conventional newspaper classified sections. During a particularly disheartening day, what's to stop employees shopping around for an alternative employer, if the means to do so is right on their desktops?

The lack of formal guidelines on Internet use makes it difficult to reprimand chronic offenders who spend more time at eBay or viewing porn sites than they do on an Excel spreadsheet.

Cyberbludging is not only about lost productivity; it also raises serious questions about responsibility. According to Leif Gamertsfelder, a solicitor with Deacons Graham & James specialising in Internet-related legal issues, an employee using work Internet resources to download pornographic material exposes themselves and their employer to sexual

public relations at the New York headquarters of Xerox, has little tolerance for abusers of corporate Internet access. Last year, the company fired 40 of its workers for "inappropriate use of the Internet", after making the company Internet policy widely known through periodic email reminders and postings on the company intranet. The workers were caught in the act by the "reactive monitoring" tactic used by Xerox in which a comprehensive log of Internet sites visited every month is scanned for "red flags" — sites considered inappropriate for workplace access.

"The computer, Internet access and email system are company resources, just like the telephone and copier," Carone said. "The company has a right to protect these resources, as it does for all other company-owned properties. When employees abuse their Internet privileges by spending an abundance of work time on non-work-related sites, Xerox has an obligation to its shareholders to take action."

It is a sentiment shared by an increasing number of companies that have

A recent survey found that 76% of respondents monitor the email of their workers for suspected email abuse or for system maintenance purposes. Of these, an alarming 65% do not inform their staff that the monitoring is taking place.

harassment liability should someone take offence at porn in the workplace.

"Cyberslackers that download and distribute pornography waste productive time, consume expensive bandwidth and could be in breach of sexual harassment laws," Gamertsfelder said. "Under sexual harassment laws, an employer has a duty to provide a workplace free of sexual harassment. If cyberslackers download or distribute pornography on a LAN or WAN and that pornography offends a coworker, the employer could be liable for a breach of the sexual harassment laws. To avoid being caught with their pants down, employers must ensure that their technology use policy prohibits this type of activity. Also, employees must be monitored for compliance and the policy must be enforced."

The threat of sexual harassment liability has caused employers to rethink their attitudes towards Internet access, to formulate carefully worded Internet policies and, more often than you might realise, to instigate widespread surveillance of their employees' Web-surfing habits.

Christa Carone, director of corporate

cracked down on the cyberbludgers in their ranks and fired those found to be mixing business with pleasure. In Australia, Telstra and Centrelink have suspended employees for porn-related Internet use, and their actions have sparked enormous public debate on the issue. Privacy and the employer's right to monitor Internet activity proved to be major points of contention.

In response to arguments such as these, Carone has only one thing to say: "For Xerox, Internet surveillance is not about privacy. It's about productivity."

Caught in the act

Telstra, Xerox and Centrelink are not alone in their efforts to stamp out cyberbludging. A recent survey of major Australian companies conducted by international law firm Freehills found that 76% of respondents monitor the email of their workers for suspected email abuse or for system maintenance purposes. Of these, an alarming 65% do not inform their staff that the monitoring is taking place.

The means of monitoring are many and varied. A simple method is Internet access control (IAC) software, which comprises a database of objectionable sites maintained by the manufacturer, and updates are provided to users at regular intervals. This kind of software is most commonly directed towards home users. It promises to ease the concerns of parents by blocking sites considered unfit for children's eyes. However, this form of software is not without its limitations, as there is no surefire way to restrict *everything* that you might find objectionable. This is a common complaint in IAC software reviews.

Internet access management (IAM) software is most common in the corporate market. The software allows IT managers to select the types of sites to be blocked, the times that restrictions should apply and to whom, and reports attempts to visit restricted sites by individual users. There are countless products on the market aimed at catching cyberbludgers in the act, such as Websense, SurfControl, X-Stop, WebSpy and Symantec's I-Gear to name a few.

Another popular cybersurveillance package is LANguard, which 'scans' network traffic for content and can display, report, log and alert IT managers to objectionable site visits or activities. This means that you can view sites as they are being visited by staff, as well as any other Internet connections (such as IRC). As you are able to monitor the content of your staff's Web activity, you can block specific actions without restricting access entirely. For example, you can prevent searches on Google which use specific keywords, without blocking all access to the search engine. As the software does not run on a proxy server, the speed of Internet access will not be affected by its presence. It also provides some protection from external threats (such as hacking), which adds to its popularity.

"Without software to monitor potential abuse and to block access to illegal and time-wasting sites, companies have no real way to avoid the dangers," SurfControl's Corbelli said.

"As soon as employees know that they are being monitored, they do tend to change their surfing habits to conform to the rules of the company, and abuse is drastically reduced. Many of our end users state that their staff are far more happy with the software in place than without it, as it does protect the user and ensures they do not get themselves into trouble by unwittingly being taken to an illegal site that they did not want to navigate to in the first place."

Getting the message across

Putting together an acceptable use policy (AUP) is not easy. A badly worded policy could mean legal hassles down the track. Here are some suggestions from the Privacy Commissioner to bear in mind when drafting your business' AUP.

- Distribute the policy to all staff by way of a pop-up screen each time they log onto the network.
- Ensure that the policy is understood. Make yourself available to answer any questions.
- The policy should be explicit as to what activities are permitted and forbidden.
- Specify what information will be logged and who in the organisation

will have access to the information and content gathered.

- The policy should refer to the organisation's computer security policy. Improper use of email may pose a threat to system security and staff privacy, and leave the company open to legal liability.
- Use plain English to spell out how the organisation plans to monitor or audit compliance with the rules relating to email content and Web browsing.
- Spell out the penalties for noncompliance with the policy.
- Review the policy regularly to keep abreast of changing technology and the Internet. Re-issue the policy whenever a significant change is made.

Whether an organisation has the right to monitor the Internet habits of its workforce is a question that lies at the heart of the cyberbludding debate. Employers definitely have the upper hand, as there are no laws against cyber-surveillance. To clarify the situation, the Australian Privacy Commissioner issued

comprehensive guidelines on the subject of workplace email, Web browsing and privacy in March. As there is no general constitutional or common law right to privacy in Australia, employers can legally monitor their employees' Internet habits. It is recommended that the company position be made clear to employ-

ees in the form of an acceptable use policy (AUP) to circumvent legal wrangles when employees cry foul at being caught out by surveillance software.

"Cyberslacking is a very serious issue for any corporation," Gamertsfelder said. "If a corporation takes adequate steps to notify its employees that their email or Web browsing activities will be monitored by the IT manager, then there are no grounds for arguing that it is unlawful. These notifications should be part of a corporation's technology use policy and should be given to employees at the time of induction and at regular intervals during the term of employment. This will pre-empt any argument by an employee that there is an implied contractual right to use email in a surveillance-free zone."

However, careful attention should be paid to the drafting of the AUP, and what is acceptable and what is not should be clearly defined. Without a clear and precise policy, companies can find themselves unable to stamp out cyberbludding or other perceived abuses of company resources.

"A technology use policy will be useless if an employee can't be disciplined for breaching it," Gamertsfelder said. "If a policy is poorly drafted or implemented, it will be extremely difficult for an employer to

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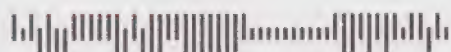
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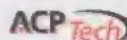
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dismiss an employee for a serious breach of that policy. Workplace relations legislation prohibits an employer dismissing an employee if that course of action is 'harsh, unjust or unreasonable'. Where an employer relies on a poorly designed or implemented technology use policy, dis-

missal will almost always be deemed to be 'harsh, unjust or unreasonable'.

Companies that spy on their employees should refocus their efforts on being better managers, hiring better people and keeping their talented employees happy.

ment and was considered a breach of the company IT and email policy, which permitted use of the technology only for the purpose of performing authorised business activities.

Ambiguous wording in the policy proved to be Ansett's undoing. The court

found that Gencarelli's email informed workers of matters relating to the Ansett enterprise agreement and fell under the scope of the IT policy. The finding was perceived as a victory for workers, and a timely warning for employers to rethink their guidelines on acceptable use of email and the Internet in the workplace.

Not everyone is pleased with the move towards surveillance and the threat it poses to would-be cyberbludgers. One opponent of surveillance software is self-made champion of the cyberslacker, Don Pavlish, creator of donsbosspage.com, a Web site

devoted to the art of cyberslacking. The site offers games and other distractions, and should the boss unexpectedly walk past your desk, provides a 'panic button' in the form of a ready-made spreadsheet that saves you from a close call. Pavlish is angered by what he perceives to be the "atmosphere of fear and mistrust" that is created when employers attempt to seek out cyberbludgers with the aid of surveillance software.

"Today's workforce is being driven harder than ever before," Pavlish said. "Employees are expected to work longer hours and endure tiny cubicles within a corporate system that does little for the human spirit. Surfing the Web is an easy, obvious and absolutely necessary way to maintain sanity. It's considered perfectly acceptable in many companies for workers to take breaks around the water cooler, or to smoke in the parking lot. Why is it so wrong to surf the Web instead?"

Pavlish also argues that surfing the Web at work need not always be considered cyberbludging. "An employee could be emailing a family member, doing their banking or buying groceries online. With so little time available for personal chores these days, doesn't it make sense for companies to encourage employees to use the most efficient tools at their disposal?"

Rort or recreation?

Rort or recreation?

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Obviously there are serious abusers of company resources, but opponents of surveillance tactics such as Pavlish argue that good managers can tell who is getting their work done without the need to resort to clandestine monitoring of the entire workforce.

"Unfortunately, [surveillance] tends to frighten the smart, responsible people the most. The stupid ones will surf anyway and get caught regardless. Companies that spy on their employees should refocus their efforts on being better managers, hiring better people and keeping their talented employees happy. This will cut down on wasted time in the workplace faster than any cybersnooping software ever could. If an employee is spending all day surfing the Web, shouldn't their supervisor be able to catch this without help from cybersnooping software?"

Pavlish's sentiment is shared by Electronic Frontiers Australia chairperson Kimberley Heitman. He argues that the monitoring of Internet use is an unnecessary practice. "Education and discussion is preferable in the first instance. There are few occupations where monitoring employee use of the Net is essential. The test of productivity is whether the employee does the work on time, not whether stray sites were visited."

Employers who have uncovered persistent time wasters or hard-core porn viewers in the office are champions of cybersurveillance and will sing the praises of the software. However, some sceptics argue that the cyberbludging epidemic is merely a figment of surveillance software manufacturers' imaginations. As they stand to gain the most, they drum up a bit of business for themselves and get employers on side with tales of deviant workers.

This is a slightly paranoid argument, but it should not be ignored. Surveillance software manufacturing is fast becoming a multimillion dollar industry. According to research company IDC, surveillance software manufacturing was a \$US63 million industry last year. This figure is expected to snowball to \$US562 million by 2004, so it's not only satisfied employers who are reaping rewards from the surveillance of workers; it's the manufacturers as well.

Another argument against the use of cybersurveillance software lies in the potential mishandling of private information gleaned from employee surveillance.

Consider this: a person goes to the doctor for a routine check-up and a series of tests. The doctor forwards the results via email and reveals that the person is at risk of a potentially life-threatening disease. At the same time, their employer conducts the

usual round of email surveillance to ensure it is used for only work-related purposes. The IT officer reads the email and reveals the person's predicament to coworkers. Human resources becomes involved in the brouhaha and fears a lawsuit. The CEO is informed. The person's insurance company is notified and reconsiders his coverage in light of the test results.

This story seems unbelievable, but it has been verified by one vocal opponent of cybersurveillance, Michael Hoffman, who is executive director of the Centre for Business Ethics at Bentley College in Massachusetts. The anecdote raises many questions (not only about the bedside manner of a doctor who would inform a patient of a life-threatening illness via email) and serves as a cautionary tale about the need to temper surveillance and the damage that can be caused by the irresponsible handling of information. Such matters should be dealt with clearly in the AUP to alleviate employee concerns.

The causes of cyberbludging do not lie entirely with idle workers. With the World Wide Web and all of its distractions at your disposal on the desktop, surely the odd indiscretion is understandable. Addressing the first annual conference on 'Cyberslacking in the Workplace', held in San Diego this year, psychologist David Greenfield claimed that the Internet is "more powerful than the telephone, the TV or anything else". He blamed employers for planting the seed of cyberslacking in the first place by providing unrestricted access to the Internet.

"Would you put a TV on the desk of each employee?" he asked the conference. It is an interesting take on the issue. Do employers only have themselves to blame for cyberbludging?

The answer does not lie in removing Internet access privileges altogether, as the Web is a valuable research tool for many professions. The only real way to tackle the problem of cyberbludging, according to Gamertsfelder, is to develop a fair AUP that lets employees know where they stand and at the same time minimises any dissatisfaction staff might feel towards management.

"A technology use policy should not necessarily prohibit all non-work-related use of the Internet. Employees may have more time at their disposal — and therefore be more productive — if they can pay bills online rather than walking to the bank, waiting in a queue, withdrawing cash and then trudging off to the utilities provider to pay the bill.

"A balance should be struck in a well-designed and implemented technology use policy." ■

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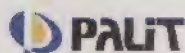
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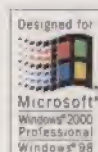


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B2Bust: The hard slog ahead

Many businesses recognise the potential benefits of business-to-business exchanges, and are working on developing B2B technology. However, the real challenges will emerge once the technology is in place. David Braue looks at why businesses need to forget the hype and rethink the way they work.

Business-to-business online trading exchanges have been welcomed because they help streamline transactions, allow more flexible and powerful strategic alliances and improve access to major companies by small suppliers. They also allow members of online trading communities to pool demand to take advantage of purchasing economies that have long been the exclusive domain of industry giants.

IDC Australia estimates that B2B exchanges will account for 55% of activity in Australia's expected \$US13.7 billion ecommerce market of 2004. The potential revenue from facilitating B2B exchanges has sent new technology suppliers scrambling to form strategic partnerships that will help them stake their claims. Fortunately for many smaller providers, B2B exchanges are coalescing around particular business communities. This means those small providers can use management experience to build a strong presence in one industry sector, and not have to compete across multiple industries.

Enthusiastic discussions about the potential of B2B exchanges are driving a raft of technology development projects, but far larger challenges await. The development of initial technological prototypes may come within six to 12 months, but well after the technology is complete, B2B exchanges will face a far more difficult problem. They must align dozens or hundreds of companies, each of a different size, structure and management philosophy, around a single way of doing business that is still quite foreign to many.

Since it began developing from a conceptual to practical stage in 1996, the PeCC (Pharmaceutical Electronic Commerce and Communication) project has been watched carefully. The project is Australia's first major effort to impose industry-wide ecommerce discipline within an Internet-based trading community. With sponsors that include the fledgling National Office for the Infor-

mation Economy, PeCC was formulated to streamline communications, purchasing, distribution and the many other processes involved in Australia's \$40 billion healthcare sector. It started with the \$6 billion pharmaceutical industry, which employs more than 11,000 people and includes about 700 major suppliers.

By reducing costs and streamlining the production and transfer of pharmaceutical goods, PeCC was initially held to be capable of massive savings — some \$340 million per year for hospitals alone, based on the combined 1994/95 figures of \$1.43 billion cited in PeCC's founding documents.

Lower costs, faster restocking, improved efficiency, and better supply management were all cited as compelling reasons to hasten the adoption of PeCC. However, by last year the venture had only attracted about 50 suppliers online,

along with the five original manufacturers involved in supporting the project. Even now, fewer than 100 companies have joined.

Although he considers many PeCC milestones to be major successes — most notably, the completion of the Pharmaceutical Extranet Gateway (PEG) for linking wholesalers and manufacturers — PeCC project director Pat Gallagher said the venture's failure to penetrate even one-fifth of the pharmaceutical industry over four years highlights the challenges that await the many B2B ventures that are now forming.

Gallagher, who has been involved with PeCC from its inception and was instrumental in convincing its early participants to join, recently spoke with APC about some of the challenges he has faced, and why he thinks B2B startups still have a lot of learning to do.



Illustration by: Christopher Neilson

APC: *What has been the biggest challenge in building support for PeCC?*

Gallagher: Try as we might, we're not doing a very good job of getting suppliers onboard. We've been using politeness and carrots, but our five core companies are trading with up to 700 companies and we're still struggling to get our first hundred of those.

We're having all the classic problems of change. We've got the people at the top who are very supportive, but as we work our way down these very large organisations, we meet resistance to change. We underestimated this: we're affecting tens of thousands of people, and they're asking, 'If we do this, where's my job going to go?'. There's this feeling of comfort with the fax machine.

Knowing what we know now, we would probably not have any project managers at all; we would try to instil in companies that this isn't a project about corporate change that threatens you. Rather, this is a project that everybody's going to benefit from. Project management of these things has got to come from within, not from

instead of 60 days. It's the only driver that will make this happen.

APC: *But that's the catch-22: they won't realise all this until they've gone online.*

Gallagher: It's almost one of those Y2K or GST issues, where you've got to have everybody saying the right thing until people feel that it's inevitable and they're comfortable with it. We've spent this time, we know it works, it's not a threat, and it's going to be great for everybody. Now it's just a matter of saying, 'Now what?'.

From now on, we're going to put on the accelerator. We're about to make a quantum leap: over the next 12 months, the people driving this have decided the time has come to put drop-dead dates on it.

APC: *Given the challenges you have faced, what do you think about corProcure which will electronically connect 14 of Australia's largest companies to a massive open marketplace?*

Gallagher: corProcure was wonderful news, because it reflects the commitment of CEOs to real change. One of the reasons I welcome the corProcure announcement is the message it sends. But I despair when they talk about their timings; it indicates

understand: value adding will always be required, and that doesn't mean because some IT person with an MBA thinks, 'This is a terrific idea'. People at the other end don't want to be stopping work every five minutes to receive another parcel; they want a pallet. If exchanges are going to be intermediaries, they have to think the supply chain through, right down to the customer.

In PeCC, I've got 160 members, and when I give them my fixed PowerPoint address, generally I get a stunned silence, because I'm telling them this isn't about hype. I recently asked how many companies in the audience had directors on their boards that have come from warehousing and logistics, and when three people put up their hands I said, "You're the ones that are going to be OK".

What's difficult about this is that you can say something that makes perfect sense to you, but riles everyone else. CFOs and CEOs frankly don't want to hear it, but if they want to spend big money on the superhighway, they still have to do a lot of work on the dirtway, and there is no quick way; it's slow, plodding, unsexy and mandatory work.

APC: *Do you find executives have problems working so closely with competitors?*

Gallagher: This is the big lesson of B2B: if big competitors can't collaborate, nothing will happen. Any one company in an industry sector that says, 'I am going to go it alone' will go it alone to their doom. If there has been one indirect, indisputable success of PeCC, it has been that it illustrates how five fierce competitors can put aside their inherent competitiveness and come together to fix the problem.

The wonderful thing about PeCC is software: we've got this high-quality business tool, but it's still boutique. The process and practice aren't the problem; the problem lies in getting them to walk across the line. Once they get into it, they'll never go back.

It makes perfect sense for buying competitors to come together, but it's much more difficult for supplier competitors to come together. Until CEOs see this in the same way as they saw Y2K and the GST, there's not going to be a mass movement for the human beings in the business community to come together for a common reason. But until they do, we say, 'We can now tell you what to do. More importantly, we can tell you what not to do'.

All we know is that if you don't jump on this bus, you'll get left behind; if you try to stand in front of it, you'll get run over. But when you get in your seat, there's still nobody driving it and we don't know where we're going. ■

We're affecting tens of thousands of people, and they're asking, 'If we do this, where's my job going to go?'. There's this feeling of comfort with the fax machine.

without; we've tried project managers who are good-quality professionals, but because they don't have an understanding of the inner workings of big business, they can't carry change through to the business.

APC: *What will it take to get these reluctant SMEs (small to medium enterprises) onboard?*

Gallagher: We've researched thousands of SMEs since 1994, and they have it fixed in their minds that big businesses are bastards. The reason SMEs are not being paid is that big businesses can't trust the invoicing, and that's the ultimate benefit of online trading and the real pleasure that awaits a B2B relationship that works.

This is one time that the big guys are trying to do the right thing. It takes away lost sales and slow payments, and it's almost too simple.

The two things that SMEs will go to are the words 'convenient' and 'cash flow'. They think that if they go online it's going to be more convenient for the big guys and less so for them, but if they go online they'll find everything is more convenient. Cash flow is the other thing; little businesses will actually see their money in the bank in the same time as big companies get theirs — in 28 days

to me that they really don't know what they're getting into. Not that it's terribly complex, nasty or awful; it's just a series of very small changes that have to be made way down the line.

We all know what the superhighway is, but until you connect to the dirtway you'll fail to get anything worth having. Nobody understands how boring, tedious and unsexy it is to re-engineer things.

Without meaning to put them down, people with MBAs assume that all these things are working, that everything is in place as it should be in the textbook, and that isn't the way of life. Even if a company is about to put four more storeys made of gold on its building, it's still advisable to spend time checking the foundation, pipes, and so on. If they just assume it's going to work wonders, there will be a sudden problem, and it will take two years to fix.

APC: *Where do you see the biggest gap between textbook utopia and business reality?*

Gallagher: [Even though online procurement makes it easier for employees to buy goods], we don't want to go down the path of 'we used to deliver to you once a week, and now will deliver 20 times a week'. This is what people don't

Tripping the light WAnTastic

If you think Moore's Law is impressive, then you'll be staggered by the developments in optical networking systems. In the last 10 years, the amount of bandwidth that fibre can carry has increased enormously as a result of techniques like WDM and optical switching. Soon, businesses will discover that the WAN is no longer a bandwidth bottleneck. David Braue investigates the technology and the trends.

Wide area networks (WANs) have always been an annoyance for network architects and system developers. Their severely limited bandwidth has necessitated an economical approach to bandwidth usage, hampering the ultrafast 10, 100 and 1,000 megabit per second (Mbps) LANs now common among corporate customers.

However, after years of pining for bandwidth freedom, a solution is finally at hand. New fibre-optic networks are now using optical transmission technologies to make high-speed WAN services economical, practical and widely available. It's a phenomenon that will change the way the corporate world thinks about WANs.

At the core of this shift are the extensive fibre-optic infrastructures being established by relative newcomers to Australia's telecommunications market, including PowerTel, WorldCom, FibreTel /Amcom, Primus Telecom, AAPT and UE Comm. All have been investing furiously to rig Sydney, Melbourne and other capital cities with the fibre-optic cabling that will free them from their reliance on the massive networks of Telstra and Cable & Wireless Optus.

Terminating fibre links at key CBD buildings has allowed the carriers to establish direct relationships with corporate customers. These customers now have the opportunity to lease high-speed, intra-city, metered data services running ATM (asynchronous transfer mode) at 155Mbps or more, or dark fibre (over which they can run whatever traffic they like) in a far more competitive network landscape.

The move from leased copper WAN lines to light-based, fibre-optic cables has

had the greatest impact in urban Australia. However, Telstra's competitors are now pushing the benefits of fibre even further by expanding their intercity bandwidth using new fibre and fixed wireless infrastructures.

more appealing to many carriers than wireless solutions, because fibre provides far better performance than even the best wireless technology.

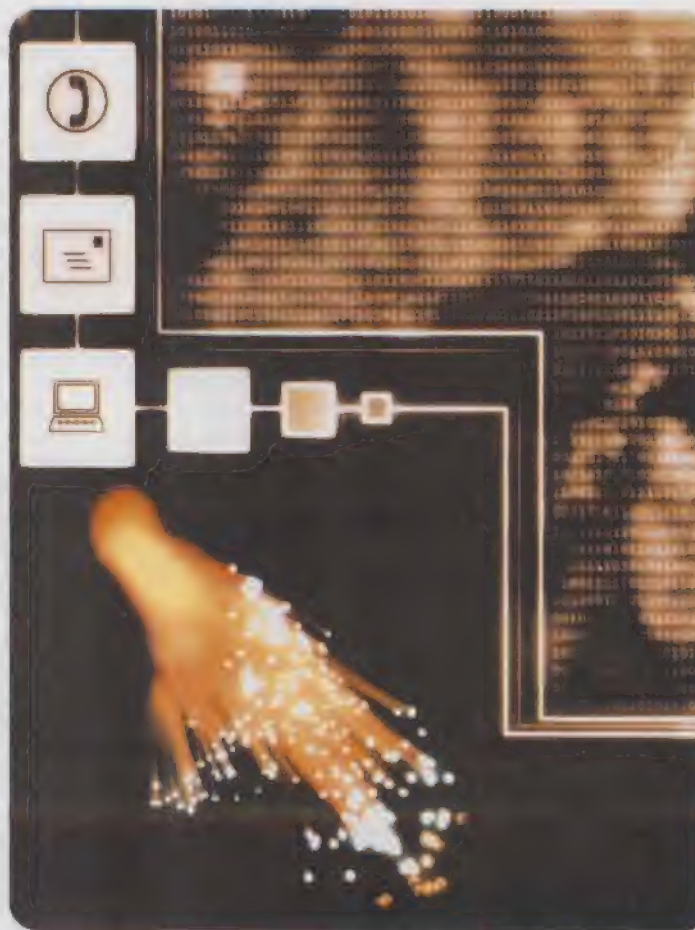
As traffic demands on fibre-optic networks increase, carriers are turning towards a new type of WDM (wavelength division multiplexing) equipment, also known as DWDM (dense WDM). WDM can substantially extend the life of existing and planned fibre-optic networks.

More fibre from their fibre

WDM technology has been used on fibre-optic carrier networks to increase voice call densities for over a decade, with Telstra leading the way in Australia after it first deployed the equipment back in 1990. Once installed, WDM systems squeeze multiple streams of light down a fibre-optic cable. Each one is transmitted at a slightly different wavelength or colour (also called a lambda) along the fibre. These streams travel along the fibre more or less independently. At the other end, they are again split into their composite data streams.

Although WDM technology has been around for a

while and is well understood, it is only the recent Internet-driven explosion in bandwidth that has made it indispensable. Early WDM devices provided around eight lambdas, but newer DWDM equipment has quadrupled this. It has also increased the speed of the data sent along each wavelength.



The combination of these technologies is providing new ways of extending high-speed services to areas where frame relay, ISDN and DDS (digital data service) connections, maxing out at 2Mbps, have long been the best option available. It's more expensive, but laying thick strands of fibre-optic cable between cities is far

Telstra, for one, has found the technology indispensable in keeping up with a national bandwidth demand that has already surpassed 18 terabytes per day, and continues to double every nine months. The company recently signed a contract with Alcatel, which is applying its experience in DWDM over submarine networks to a thriving terrestrial business. It will install its Optinex 1686WM multiplexer over Telstra's Sydney to Melbourne fibre link.

The Alcatel equipment will give Telstra 32 wavelengths at 2.5Gbps per wavelength, or a total of 80Gbps per fibre. According to Telstra chief technology officer Hugh Bradlow, this will be critical for keeping the company ahead of growing demand for bandwidth over the 1 million or more fibre-kilometres Telstra has already laid around the country.

"One of the truisms of the Internet is that the more you make it available to people, the more they use it," Bradlow said. "This self-feeds as we introduce new technologies into the network such as ADSL and cable: our traffic over the cable network has quadrupled in the past three months. So, if you're going to

dicted. As long-haul trunk lines typically include bundles of dozens or hundreds of individual fibres, it's clear just how far today's DWDM technologies can help infrastructure providers scale their carriage capacity.

Rethinking WAN architectures

The scalability that widespread DWDM deployment will allow is only a small part of the overall potential of optical networking. Its real value will emerge as corporate customers find new ways of utilising the services that will become possible when telcos can provide almost limitless amounts of bandwidth on demand.

Most notably, expensive ATM technology — which underlies the 34Mbps and faster services currently available from Telstra, Optus and a few others — will become far less important than it has been in the past, when service providers struggled to meet quality of service requirements over congested wide-area links. ATM will still be an option for companies requiring high-

today, only faster; it's driving new models about where we put resources in relation to customers and where they're using them. Most major companies try to establish three to five-year architectures, and this is a time where they should be understanding what kind of bandwidth options they'll be needing by then."

As wide-area bandwidth restrictions become a thing of the past, businesses will be able to start rethinking the way they interconnect remote offices. For example, companies will be able to remove much of the network routing intelligence they've previously had to install in branch offices, and on different floors of buildings, to manage the flow of data between internal and external domains.

Instead, the availability of almost unlimited amounts of fibre-based bandwidth will allow businesses to create serverless buildings. In these buildings applications can be managed from a single data centre, and dozens or thousands of individual desktops are little more than terminals. This centralised approach will allow for the removal of slow routers from office networks, and the provision of switched, ultrafast desktop or workgroup connections straight off the office's fibre link.

The benefits of direct fibre connections are clear to the Canadian Government, which has used 16-lambda Nortel Networks optical equipment to build a \$15 million fibre-optic backbone stretching the length of the country.

Even after reserving half of its bandwidth for national telco Bell Canada, CANARIE (Canadian Network for Advancement of Research, Industry and Education) has only lit up two of its eight wavelengths. It's already bringing massive change to schools and communities around the country, particularly in rural areas. With recent legislation forcing telephone pole owners to allow just about anybody string fibre-optic cable on their poles, condominium complexes, primary schools, remote villages, and even a convent in Ottawa, are among the network's early customers.

"DWDM technology is going to dramatically increase bandwidth and dramatically decrease prices," CANARIE's senior director of network projects, Bill St



When exposed to economies of scale, the bandwidth available through DWDM is mind-boggling.

keep on growing data quantities exponentially, you have to have a mechanism for upgrading your infrastructure to do that. Our strategy was to keep our costs, on the whole of lifecycle, at a minimum, and WDM allows us to increment our capacity without having to lay new fibre. We reckon we can get three to five years out of it without needing to lay more fibre."

When exposed to economies of scale, the bandwidth available through DWDM is mind-boggling. For instance, Lucent Technologies' WaveStar OLS 400G supports eight simultaneous fibres, each carrying 400Gbps, providing a total of 3.2 terabits per second (Tbps) of bandwidth. In September, Alcatel blew this away with a new single-fibre record of 5.12Tbps, or 128 lambdas each carrying 40Gbps — 40.96Tbps across an eight-fibre bundle.

However, this is just the beginning. Lucent chief technical officer Bob Martin said company researchers have already run as many as 1,022 wavelengths over a single fibre in tests, and he expects that number to top 5,000 before too long.

"We think that, in the not so distant future, we could get in the order of 100Tbps over a single fibre," he pre-

granularity bandwidth shaping and quality of service guarantees, but the IP (Internet Protocol) core of carrier networks will be more than adequate for most business' needs.

With 2.5Gbps DWDM already well established, and 10Gbps likely to become the standard wavelength density in the near future, the introduction of such high-speed WANs will hasten the introduction of 10Gbps Ethernet. This is already in preliminary development and is expected in prestandard products by the end of the year. This totally fibre-based standard, which bears little resemblance to other forms of Ethernet, will be equally usable over WANs and fibre-based LANs. This will allow companies to use massive interoffice links capable of aggregating the simultaneous traffic of tens of thousands of individual desktops and servers.

"For once in the history of this industry, WAN bandwidth is outstripping the capacity requirements of the LAN," David Gabo, chief technology officer with Cabletron's enterprise networking subsidiary Enterasys, said. "We see this concept of infinite bandwidth in the WAN as being more than just the same model we use

Arnaud said. "Particularly in conjunction with low-cost dark fibre, customers can now build optical networks of greater capacity. In a school board of a hundred schools, each school will have a WAN link and central server. But many school boards are running dark fibre to every school, pulling out the servers, and extending the school's LAN back to a central site, which immediately saves them on travel and maintenance. It's in the wide area, but using LAN technology such as Gigabit Ethernet straight out of the box."

Mi wavelength es su wavelength

DWDM equipment was a core design feature of PowerTel's network, which is expected to reach 400 office buildings in Brisbane, the Gold Coast, Sydney and Melbourne by the end of the year. The company's efforts had been focused on CBD areas until July, when it completed its own Sydney to Melbourne fibre. This allowed it to compete directly against Tel-

bandwidth-intensive applications, can jump on to our network and zip down the east coast and beyond," head of product management with PowerTel, Mal de Demko said.

Service providers will gain even better control over their fibre infrastructures with the coming introduction of optical add/drop multiplexers. These allow carriers to peel off individual DWDM wavelengths without having to terminate all of the eight, 16, 32 or more wavelengths on a particular fibre. For example, this would allow a carrier to provide a 20Gbps connection (by peeling off two 10Gbps wavelengths) to service a rural community or an individual building that the physical fibre passes through or underneath.

Provision of high-granularity bandwidth has been difficult. Carriers previously had to terminate an entire fibre at the location in question, convert all of the traffic on the fibre to electrical pulses, route traffic off and on to the fibre as appropriate, and then reconvert the electrical pulses into light transmissions that were once again multiplexed and sent

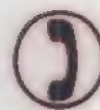
corporate data around CBDs and the country, but once that data arrives at its destination, it still has to go through the time-consuming process of being converted from optical to electrical signals that can be understood by today's networks. For this reason, within a few years it will be the LAN — and not the WAN — that generates the biggest bottlenecks in corporate networks.

With today's enterprise network switches already running hot handling multiple gigabit-per-second data streams, many vendors are now looking at other approaches that will rectify the coming bandwidth imbalance between LAN and WAN. They're still in the research and development stages, but the answer appears to lie in the development of totally optical switches that will intercept, examine and route data contained within the pulses of light traversing the fibre.

Companies such as Xros and Hewlett-Packard spin-off Agilent are leading the way in the development of these switches, which are built around fabrics consisting of hundreds of microscopic mirrors that intercept, process and redirect data-carrying light pulses. The technology is still young, but it's clear that massive speed increases will result, as the switches allow streams of photons to be managed with the same sophistication now available in electron-based switches.

Alcatel, Nortel, Lucent, Cisco Systems, Fujitsu, Marconi and startups such as Ciena are spending billions of dollars to bolster their development teams and product lines with hard-to-find optical networking expertise. All are chasing their share of an optical transport market that research firm Dell'Oro Group pegged at \$US5.937 billion in the second quarter of this year. This is a 14% increase over the first quarter; metropolitan DWDM alone grew some 40% to \$US80.9 million with Nortel, Ciena, ONI and Sorrento leading the market.

At this rate, the 2000 optical market should weigh in at nearly double the \$US15.3 billion recorded in 1999. This growth trend is likely to continue for some time as intensifying demand for high-speed Internet services sends carriers and customers scurrying for better ways to use their fibre. ■



stra in linking businesses with offices in Australia's two largest cities. Using DWDM equipment from Nortel Networks, PowerTel can provide up to 80Gbps of capacity over that link, and will add equipment into other areas as demand dictates.

"The smart building philosophy will provide infinite bandwidth to a building, and practically infinite scalability, so that any customer, be it an SME, a sizable company or somebody running huge

along the fibre. This convoluted process increases complexity, introduces additional potential points of failure, and slows data transmission during electrical-to-optical conversions.

Data at the speed of light

The transition from electrical to optical WANs will revolutionise the movement of

Weaving the Web

If you want to create your own Web site but the technological knowledge required seems insurmountable, then this month's Just DIY might provide some inspiration. If you had asked APC staffer Laura Kane what HTML was when she started a project to build her own Web site just over a year ago, she would have thought you were talking about the latest boy-band — now she's contemplating incorporating Flash content into her site. She recalls the time she gingerly took her first steps into the world of the Web.

APC hasn't neglected those who want more advanced Web design instruction, either: our Insite column will show you some simple applications of ASP, and Practical Java shows you how to enliven your Web pages with Java functionality.

Windows 2000 may be stable and powerful, but its reputedly poor compatibility with existing desktop software is making a lot of PC owners reluctant to upgrade to it. If you are considering upgrading to Windows 2000, APC can help you predict potential compatibility problems with your existing software and work around them should you choose to go ahead and install it.

Moving from the micro to the macro, Workshop also gives you the big picture when it comes to developments in infor-



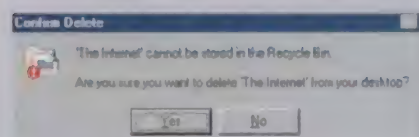
mation technology. This month, Core discusses the latest digital video encoding techniques and explains why DVD is better than VCD. For details on the rest of this month's Workshop, see the contents section at right.

Andrew Colley, Workshop coordinator

Workshop is a reader-input section. Please send your ideas, comments or criticisms to workshop@acptech.net, or to our snail mail address: APC Workshop, PO Box 4088, Sydney NSW 1028.

Bug of the month

OK, I know, strange screenshots are getting a bit old. However, this one from buggist Chris Ronnie tickled my funny bone.



Delete the whole Internet? Hmmm. Could Microsoft conceive such a plot?

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acptech.net or snail mail to APC Bug of the Month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a software prize. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in this column in APC January. So start hunting!

Michael Smith



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*Take a closer look at hard drive interfaces,
areal density and fragging.*

Heads on platters

Last month, Technobabble began looking at hard drive specifications. We covered drive sizes, CHS addressing and how drive heads quite literally fly. This month, Technobabble grapples with areal density, interface issues and what you can do with a dying hard drive. If you haven't read last month's column, it might be worth going back and taking a look. You'll probably get more out of what follows if you do.

Areal density

Hard disk research and technology hasn't moved as quickly as processor technology has, but one thing has increased in leaps and bounds. That's the expectation that hard drive sizes will continue to grow as people find more and more data to fill them with. The key to increasing hard disk capacity without ending up with drives the size of Uluru is increasing areal density. What exactly is areal density?

Simply put, areal density is the data density of an individual track. Many factors determine a drive platter's areal density. The first determinant is the media type used to build the platter. Advances in magnetic media have led to platters that have greater bit densities in their tracks. There are two factors that affect areal density: head type and glide height.

Two heads are better than one

The read head of a hard drive floats above the surface of the drive platter, picking up and altering the magnetic signals from the platter. The important determinant here is the height at which the read head glides. The closer the drive head is to the platter, the more sensitive it is to variations in the disk's magnetic field. The more sensitive the head is, the smaller you can make the gap between magnetically varying regions. This means you can increase the density of the track without compromising the ability of the drive to accurately read the data. This is a simple way to increase the drive size, but it does have its limitations. There are definite limits to how close you can put the magnetic head near the magnetic field before it all becomes a magnetic mess.



Making the platters as smooth as possible during the manufacturing process can help increase areal density. The smoother the surface you're flying the head over, the lower you can safely fly the head, and the higher the data rate you can achieve.

The other way you can improve reading capacity, and thus get away with packing the data more closely, is by altering the way that the head works. The earliest read heads for hard drives were inductive, and quite simple in composition. The inductive head is basically just an electromagnet, made up of an iron core wrapped in wire, through which a current passes. As the current passes through the wire, it creates a magnetic field in the core, which can be used to alter the magnetic properties of the platter over which it passes.

In simple inductive heads, the same head can be used to write and read from a drive. In the write operation, the induced magnetic field is used to alter the magnetic properties of the track. In a read operation, the reverse is true: the magnetic properties already imprinted on the track can be measured (read) by the difference they create in the head. Inductive heads are reasonably simple to manufacture, but don't provide many avenues to increase data capacity.

The one way you can increase density with inductive heads is to focus the range of the head. This involves having smaller read heads with tightly defined read and write areas. The magnetic poles of the

core are wrapped closely together in a horseshoe-like manner, and there is a strip of nonmagnetic material to separate them. The smaller the head, and the smaller the gap that can practically be used, the smaller the overall read/write area. However, inductive heads can only do so much to improve areal density.

The next generation of heads to come into use were magnetoresistive (MR) heads. These work in a different way to inductive heads. Rather than creating the magnetic fields through an electromagnet, MR heads measure the changes that magnetic fields cause in certain ferrous materials. Typical MR heads are a combination of iron and nickel. The changes that occur are subtle, but measurable. Measuring magnetic change is great for reading data. However, an inductive head is still used for writing data. This is located just next to the MR read head. Separating the two heads can improve performance significantly, as switching between operation modes is not necessary. It also allows the defined read areas to be much finer.

Still being refined is the GMR (giant magnetoresistive) head, which works like the MR head, but with capacity gains up to three or four times. GMR works on the principle that the resistance across alternating layers of metallic and nonmetallic substrates can be measured through extremely small areas. GMR is often referred to as spin valve technology, because the common application for it requires one of the magnetic layers to be

held in place (usually with a separate electromagnet) while the other layer (still separated by a nonmetallic layer) spins on top. GMR technology is still being improved; the first lab samples were tested in 1991, and GMR drives hit the market in 1997, but there's still a lot of refinement required. The next generation of GMR has already been dubbed 'colossal magnetoresistive' (CMR), which should give you some idea of the scope of drives to come. By the way, a giant magnetoresistive head isn't in any way bigger than an MR head — the 'giant' refers to the increased sensitivity of the read head.

A real spinout

Raw drive speeds are also improved by increased areal density. If the magnetic fields are spaced extremely closely, the head reads more data on a single pass than on a disk platter with larger gaps. Last month, Technobabble discussed drive speeds, and the difference between hard drives and other media, most noticeably CD-ROM drives.

You've probably seen hard drives rated by their speeds. These can range from 3,600 to 10,000rpm. Early hard drives spun at 3,600rpm, primarily to match the frequency of the AC power motors they used. Later developments moved the power source away from AC motors (which aren't good for systems that are susceptible to small-scale static) to internal DC motors, and the need to match frequencies with the external power was removed.

Obviously, there are advantages to increasing the spin speed, whether you use CAV, CLV or a combination of the two. Some drives spin up to 10,000rpm, but this is not yet standard. The average rate is still between 5,400 and 7,200rpm. If you're wondering why drive speeds aren't increasing rapidly, the answer lies with physics.

As an object spins, centrifugal force tends to scatter its contents. This problem can be overcome with better-quality manufacturing, but that costs money. The faster a drive is pushed, the greater the chance that it will fail in the manufacturing and testing process. Thus you get an increase in cost.

Only high-cost/high-capacity drives are currently spinning at 10,000rpm, but that's likely to change as more fabrication plants move to producing faster drives, and the technology improves. However, there is still a limit on drive spin speed.

The motherboard end

This column has not covered hard drive interfaces, so let's take a look at the dif-

ferences between the two major interfaces. If you're using a PC, you're probably using IDE interfaces for your hard drives, and therefore you'll be using IDE drives. Many Macs use SCSI interfaces and drives. SCSI (Small Computer Systems Interface) has a wider data bandwidth than IDE. This means faster hard drives that are ideal for data intensive tasks, especially design tasks where the files tend to be huge. It's part of the reason (aside from ease of use) why Macs are so popular in the design community.

SCSI isn't a Mac-only technology; it's just a more expensive interface, and the prime driving force behind PC sales has almost



always been to lower prices, which is why IDE remains popular with PC users. The gap has narrowed between the two as the speed of IDE interfaces and drives has improved more quickly than SCSI. However, SCSI has other advantages, which APC will cover in more detail in a future Technobabble.

The bottom line is simple: if you're after data-crunching at high speed for things like real time video editing, then SCSI or a high-speed IDE drive is a good idea. Of course, it'll hit you hard in your hip pocket. If money is no object, you could even go for the newer generation of drives that are neither IDE nor SCSI, but use the IEEE 1394 interface, commonly referred to as FireWire. FireWire drives are still at the specification stage, but several manufacturers expect to have drives available in the near future. At first, they're likely to be used only in dedicated audiovisual equipment; they won't be cheap, but they will be fast.

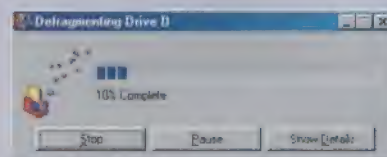
Alex Kidman

Hard drive fragging

One area that commonly confuses new computer users is scanning and defragmenting drives to ensure their maximum shelf life.

Over time, the magnetic media on the drive platters wear out. Once a bad sector develops on a hard disk, there's precious little you can do about it. However, it's extremely useful to know about it.

If you can afford it, switch to a new, working drive. This way there'll be no nasty surprises like your vital data ending up in a dud sector. You don't have to do this of course, but continuing to use a drive with bad sectors (especially if the number of dud sectors is growing) is very risky.



Defragmentation is necessary not so much because of the way drives are made, but because of the way people use them. Drive recording is done sequentially, so all the blocks in an application are recorded onto the drive together.

If you then delete that application, the next request for space will start to fill the gap. The chances are that the gap and the new data won't be identical in size, so the remaining data will then be shuffled to the next available gap.

This can mean files and applications start on the inner rings of a platter and conclude at the outer edge. This leads to a large amount of latency as the drive heads move around trying to find all the data.

Defragmenting applications sort the data on the drive into sequential blocks, which drops system latency times. How they do this varies depending on the operating system (which determines file and cluster sizes) and the defragmentation application you happen to be using.



Alex Kidman can be contacted at alexk@apctech.net



For a complete archive of APC Technobabble columns, see apcmag.com.

Sort out all those digital video formats and learn why not all digital video is created equal.

Making a good compression



Most people don't know the difference between VCD and DVD. Although the two are worlds apart in terms of features and quality, uptake of the latter is only starting to strengthen, while the former has been available for some time throughout East Asia, and in the form of cheap under-the-counter CD movies. There's also a new format called DivX, which bridges the gap between the two. Core is here to help you cut through the confusion.

VCD

Video CD (VCD) is a standard that most movie studios probably wish had never been created. Few studios have legitimately published any titles in the format, but VCDs are rampant throughout East Asia. CDs are so cheap to produce that pirates have adopted the format, and they currently print and sell movies for only a few dollars each. These are very easy to obtain in East Asia, and provide cheap, durable, random access video of equivalent quality to a VCR.

VCDs are standard CDs, capable of being played in CD-ROM drives and standalone VCD players (most DVD players can play VCDs as well). The video is stored in a set of files that are placed in a particular arrangement on the CD. VCD uses standard ISO encoding and it's possible to copy and paste these files as you would any other on a PC.

The codec used is the venerable MPEG-1, which is a system that provides very high compression rates on VHS-quality video. The frame size can vary slightly, depending on the type of encoding used (320 by 240 is probably the most common). The frame rate also varies, depending on the type of system the video is encoded for: 30fps for NTSC, 25fps for PAL. The audio is encoded using MPEG-1's built-in audio encoding system at layer 1, 2 or 3 (the latter is best known as MP3), which provide successively higher levels of compression.

Most modern computer systems are capable of decoding MPEG-1; anything above a Pentium 150 should be up to the task. When a VCD is viewed with the clear definition provided by a computer monitor (and at the close range this usually involves), the poor quality of the VCD format is revealed. They're better suited to TV screens, which don't have the pixel correctness of computer monitors and thus interpolate the images a bit better. Usually, a VCD image will look a little like an image from a slightly worn VHS tape.

A feature-length movie will come on one or two CDs, depending on the length of the movie, the amount of action and the degree to which the encoder compressed the video (see 'MPEG compression levels'). It's not very difficult to create one's own VCDs: a PC, a CD burner, the right software (which ranges

MPEG compression levels

One of MPEG's key features is its scalability. It's possible to increase or decrease the bit rate and the total size of the movie, but this inevitably affects the quality. Like JPEG, MPEG divides frames into blocks and defines the colour of each pixel in a block by its relationship to the median colour of that block (a process known as discrete cosine transformation, or DCT). For instance, if a block consists mostly of skin-tone colours, then the encoder will find a median skin-tone colour and redefine all other pixels in that block to represent their difference from that median (darker, lighter, slightly different hue and so on). Why? So the pixel colours can be more easily flattened.

This is an oversimplification of the coding process, but in lay terms, the compressor will take a succession of identical pixels and redefine them as a word — this is something along the lines of saying 'Draw 200 blue pixels' instead of 'Draw blue pixel. Draw blue pixel. Draw blue . . .' However, in a normal photographic image, 200 identically coloured pixels are rare. Instead, there are various subtle shades, some indistinguishable to the human eye.

If high compression is required, MPEG can use the DCT'd blocks to squash subtle variations and present an image to the encoder that has fewer variations and is therefore more compressible. The degree to which it does this depends on a compromise: higher compression means lower quality. Videos with very high compression ratios are obvious to the human eye, as they develop 'artefacts', which are blocks of colour that look less than natural.

MPEG also has a complicated interframe compression system that only presents changes in most scenes, rather than full frames. This includes motion compensation for panning or

moving objects. MPEG-2 has a complex sequence of full frames, interpolated and predicted frame contents. The newer MPEG-4 standard also supports objects, where each scene element is encoded and decoded separately, and there is an extra stream to synchronise the objects. For instance, the actors and the background can be treated as separate objects that are overlaid and have different decoding priorities. In all forms of MPEG, the level of compression, and hence the bit rate, will be affected by the amount of difference between frames. High-action takes are generally less compressible than shots that are mostly static.

In many ways, MPEG audio encoding is similar to its video encoding. It removes subtle variations that the human ear doesn't pick up, and waveforms that are masked by other sounds. Collectively, these techniques are called psychoacoustic modelling.

As anyone who has listened to MP3s will know, it's not a perfect system. As with MPEG video, too much compression becomes very obvious. A highly compressed MP3 lacks the depth and timbre of an uncompressed sample, just as a highly compressed MPEG video looks flatter and less defined than the original video.

from freeware to expensive professional applications) and a video file is all that are needed. However, getting the compression levels right might take some experimentation, and it's not quite as simple as burning an MPEG file to a CD.

DVD

Digital versatile disk (DVD) is starting to take off in a big way in Australia. DVD-ROM players are almost standard in new PCs, but they are next to useless for running software due to the dearth of DVD software titles. DVD movies are where it's at.

The DVD standard supports higher resolutions (four times that of VCD), interactive features and menus, multiple camera angles, chapters, multiple audio tracks (for different languages or commentary), parental control and multiple subtitle tracks — all in a format the size of a CD.

DVDs are encoded exclusively in MPEG-2 video, but many support other audio formats such as THX or Dolby AC-3. This is the same encoding system that will be used for digital television when it appears, but the formats are very different. MPEG-2 has a variable frame size (which will enable high-definition television), but a set of standard, TV-compatible resolutions have been developed for DVD. It's possible that in the future, when new DVD-based formats are released, high-definition DVD will appear as well. The quality is better than anything else on the consumer market, but the encoding and the player that are used can greatly affect the quality of the finished product.

The physical media currently supports 4.7G on a single-side, single-layer disk, which is enough for about a two-hour movie, depending on compression levels, number of audio tracks and the level of action (see 'MPEG compression levels'). Disks can also be double layered for 8.5G capacity (about four hours), and can be double sided as well.

Although it provides the best quality currently available, DVD is not without its problems. Particularly relevant to Australian readers is regional coding. This is

DivX is a strange beast. It's a mishmash of standards, designed to enable the recording of an entire movie onto a CD.

designed to limit the distribution of DVDs, by making them playable only in certain geographical zones. Of course, modifications which overcome the regional coding by setting the region to 0 can be purchased for almost any DVD player. A region 0 player should be able to play all zones.

In addition, the original DVD specification called for standardisation on the 16:9 aspect ratio, but few distributors follow this rule. Most movies seem to be encoded in other aspect ratios, such as 2.35:1. This means that even on a wide-screen TV (16:9) you get black bars at the top and bottom of the picture. For most people, with standard 4:3 televisions, there are *huge* black bars on the top and bottom of the screen.

It's possible to get affordable software to encode video into MPEG-2, but it's an incredibly slow process and requires massive amounts of disk space for source video. In any case, burning videos onto a DVD is out of reach for all but the professionals. DVD-R drives can burn 3.9G or 4.7G disks, but at about \$10,000, they are incredibly expensive. The cost of DVD-R media is also daunting, at more than \$100 per blank

disk. However, DVD-R might become more affordable in the future as CD-R was a similar price when it was first introduced.

DivX

DivX (Digital Video Express) was originally the name of a proposed standard for disposable movies based on DVD. The idea was to build DVD movies that could be sold cheaply, but only played for 48 hours after the first play. The idea failed, but the name has been resurrected for an entirely new kind of coding system for movies. It doesn't have any relationship to the former Circuit City scheme, but refers to a conglomerate of codecs designed to bridge the gap between VCD and DVD.

The new DivX is a strange beast. It's a mishmash of standards, designed to enable the recording of an entire movie onto a CD at better than VCD quality. It came into being as a hack of Microsoft's Windows Media format, which was designed to handle only Microsoft's proprietary ASF file format. Hackers expanded it to support the AVI file format, enabling playback on other systems.

DivX is a mix of MPEG-4 video and MPEG-1 audio layer 3 (MP3) audio. The

result is a highly efficient codec that provides overall quality somewhere between VCD and DVD. The audio quality is identical to that of VCD, but the improved efficiency of the MPEG-4 codec provides superior video quality. In its most commonly traded form, the video resolution is somewhere between VCD and DVD, but like MPEG-2, it is technically scalable to extreme resolutions.

In short, it's not DVD, but it does allow people to burn decent quality movies onto a single CD. For now, DivX files can only be played back through a software decoder, so slow PCs just won't cut it. Standalone consumer players have yet to be released.

Despite what DivX boosters would have you believe, rolling your own DivXs is not yet easy. It requires trial and error, sorting through various freeware packages, and patience. Until there is software that does it all, the creation of DivX movies will remain in the hands of enthusiasts. Playback on a PC, on the other hand, is simple, and players are available for every major platform.

Nathan Taylor



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ntaylor@acptech.net



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How to make the most of FrontPage 2000, MYOB, WAP, ICQ, Mac OS 9 and iMovie.

Manual mania

How to Do Everything with FrontPage 2000

WYSIWYG Web page editors are meant to be intuitive. Why, then, are there so many books about how to use them? Often the basic functions are intuitive but the real power is hard to tap into without guidance. FrontPage 2000 doesn't quite fit this model, but it's still an application that many users find bewildering.

How to Do Everything with FrontPage 2000 is primarily designed as a reference work, rather than a tutorial guide to the program. Hence, just about every aspect of FrontPage, from simple links to DHTML, is covered from a reference standpoint.



The book reproduces almost every FrontPage dialog box you're likely to come across, along with a clear explanation of what the dialog covers.

Unlike many similar books on HTML editors, there's no CD. Along with the focus on reference rather than tutorials, this suggests that the book is aimed more at people already using the software, rather than beginners.

There are some concessions to new users such as the inclusion of the section 'You can create hyperlinks using graphics, not just text!'. However, the book would be of most value to those already familiar with FrontPage who just need to refresh their skills.

Alex Kidman

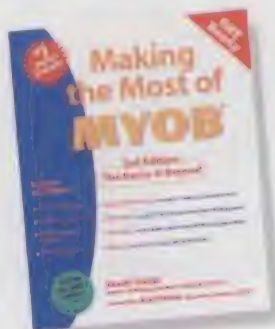
Author David Plotkin
Publisher Osborne
Contact McGraw-Hill
Phone (02) 9415 9899
Price \$42.95
ISBN 0072125756
Rating ■■■■■■■■

Making the Most of MYOB

Anyone who uses MYOB to manage their business accounts should keep *Making the Most of MYOB* handy. The third edition is right up to date and has undergone some important changes as a result of the GST.

Author Veechi Curtis has retained the practical question and answer style of the previous two editions. The abundance of subheadings and questions makes finding specific information easy. The book is brimming with neat tips, golden rules and common mistakes to avoid.

GST tips are clearly flagged, so the book is a valuable resource for businesses adapting their accounting systems and processes.



Woodslane has launched a helpful accompanying Web site, (www.bpp.com.au/myob) that provides the latest updates for the book's GST content, as well as links to other useful sites.

The author suggests that the book is aimed at both first-time small business proprietors and seasoned accountants, but those without an accounting background will benefit most. In addition to explaining how to take advantage of all the functions of MYOB, it helps readers to understand accounting concepts.

At \$39.95, this book is a worthwhile investment for any small business proprietor or accountant.

Cathie Kennedy

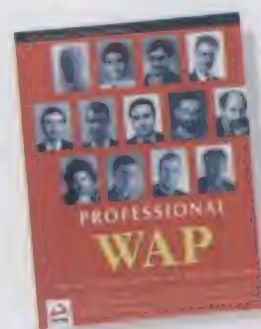
Author Veechi Curtis
Publisher Woodslane Press
Contact Woodslane
Phone (02) 9970 5111
Price \$39.95
ISBN 1875889043
Rating ■■■■■■■■

Professional WAP

A very attractive aspect of this book is that it starts off by destroying preconceptions.

It points out that WAP isn't the Internet, or a browser interface in your pocket, and it isn't universal. Instead, WAP is about accessing data on the move, in a compact format, for people who don't necessarily use computers — and nothing more.

The book provides a huge range of text-based WAP programming samples, with special reference to XML, Java, ASP (Active Server Pages), ColdFusion and conversions between the various systems. A few more real screen examples would have been useful.



The problems related to enabling email on WAP devices are covered in reasonable detail, with both ASP and Java options included for everyday use.

Security for users and data is also investigated, but little mention is made of the imminent use of cash cards for transactions using WAP applications from mobile phones. VeriSign gets a brief mention, but the book completely ignores smartcard technology.

Nevertheless, if you need to understand WAP programming and protocols to ease your transition from Web to mobile programming, the depth, explanations and examples provided by this book would be helpful.

Jeremy Torr

Authors Charles Arehart, et al.
Publisher Wrox Press
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Real-time communication on the Internet

This book is part of a series of step-by-step, visual guides called Screen Shots. As the series' name suggests, the focus is on providing screenshots with explanations, rather than blocks of text with the odd illustration.

The book is divided into two main parts. The first is on IRC, with subsections on mIRC and IRCle. The second is called Direct Communication, featuring ICQ for Windows and ICQ for Mac. Each section provides illustrations of various screens which are labelled with different coloured arrows leading to information text boxes. Green indicates an action, orange is for information about a feature, and red is used to alert you to a possible danger, such as pressing the Delete or Cancel button. There are also Checklists, which list the procedures needed to complete different tasks, as well as Notes, Notebooks, Tips, Light Bulbs and How-To tags.



The book's approach does assume some chat and Internet literacy. Perhaps for this reason, the glossary omits some very basic words, including 'browser', 'network' and 'portal'. As the book was published in Europe, some of the information, such as the list of IRC network servers, is Europe-based. A complete beginner would have to find the local equivalents.

If you've never dealt with IRC or direct communications before, this book could be a little confusing. However, as a means of finding out exactly what you can do within the software, it is an informative and handy guide.

Lindsay Hayman

Author Jean-Paul Mesters
Publisher Hachette
Contact Allen & Unwin
Phone (02) 8425 0100
Price \$27.95
ISBN 1842020404
Rating ■■■■■■

Mac OS 9: The Missing Manual

Software reviews often complain about the demise of the comprehensive manual in favour of onscreen help. Discontinuing the manual may reduce manufacturing and shipping costs, but it does nothing to help the consumer.

Help systems, hypertext documentation and related technologies can be very efficient for finding the answer to a question, but they're not as good as a book for learning how to use a program. Multimedia tutorials have some value, but they force students to work at the pace of the audio or video clips instead of progressing at their own rate.

The publishers have joined forces to fill this gap. Using the tagline "the book that should have been in the box", the Missing Manual series aims to make up for manufacturers' shortcomings. *Mac OS 9: The Missing Manual* starts with the

Mac OS 9



basics and emphasises techniques for working efficiently.

There's solid coverage of printing, scripting, and LAN and Internet networking, as well as useful appendices covering the normal and clean installation processes. In place of the now-commonplace CD-ROM, a companion Web site provides referenced software along with updates and corrections, plus sample chapters.

This title would be useful for beginners and the average Mac user who wants a guide to understanding Mac OS 9, rather than a cookbook-style publication.

Stephen Withers

Author David Pogue
Publisher Pogue Press/O'Reilly
Contact Woodslane
Phone (02) 9970 5111
Price \$39.95
ISBN 1565928571
Rating ■■■■■■

iMovie: The Missing Manual

David Pogue is very knowledgeable, and this is put to good use in his book, *iMovie: The Missing Manual*. There's no point being able to edit video unless you've got some source material, so he starts with advice on choosing and using a digital video camera, and on sound and lighting issues.

The book only covers version 1.0 of iMovie, but 2.0 is free only to those who've purchased one of the latest Macs, so people will probably use the original iMovie for some time to come. You can download a free appendix covering version 2.0 from www.missingmanual.com.

The chapter on transitions is a good example of Pogue's approach. As well as describing the available effects and how to use them, he also explains why and when they should be used (see 'Transitions should be done for a reason').

There are particularly impressive sections on manipulating the soundtrack, troubleshooting, and the

iMovie



index is well prepared. Part three, in particular, is very valuable. It covers transferring a finished movie back to the camcorder, exporting it to a QuickTime movie, creating a video CD or DVD, and putting movies on the Web.

Buy this book, study it, apply what you've learned, and your audience will be grateful.

Stephen Withers

Author David Pogue
Publisher Pogue Press/O'Reilly
Contact Woodslane
Phone (02) 9970 5111
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(Corporate IT, June 2000)

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DVD playback on the PC

DVD-ROM drives are quite affordable these days, although they're still more expensive than CD-ROM units. There is so little software currently available on DVD-ROM that most people only use the drives to add DVD movie playback capabilities to their PC.

Installing an IDE DVD-ROM drive in the average PC is as easy as installing any other IDE device. You probably won't even need to refer to the manual to

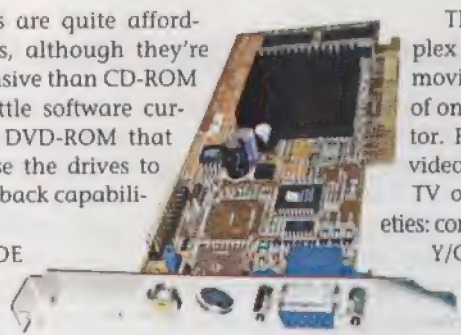
determine whether the drive is set to master or slave. It's probably set to slave by default, and most modern PCs can deal with a slave device without a master. They just make any solo device on an IDE channel work as a master, regardless of how it's set.

If you have the usual twin-drive setup where one hard drive is set to master, one CD-ROM drive is set to slave and both share your motherboard's first IDE channel, you can add a DVD-ROM by connecting it to the second IDE channel with another cable. Alternatively, you can replace your old CD-ROM drive with the DVD drive. Just unplug one and plug in the other.

Once you have a DVD-ROM drive, you need playback software. This comes with many DVD-ROM drives and video cards, or can be bought separately. You also need a reasonably current CPU. Almost any CPU faster than 300MHz is capable of playing back the MPEG-2 video data on DVDs.

The only remaining consideration is DVD regional (or zone) coding. DVD players are only supposed to be able to play DVDs released in the region they have been manufactured for. Australia's in Region 4, along with South America and various other Pacific Island nations. However, there's nothing to stop Region 4 users purchasing US Region 1 disks by mail-order to get new releases sooner.

Some playback software allows you to set which region you're in, but only a limited number of times. All of the most popular DVD playing packages can be set to different zones as often as you like by using one utility: DVD Genie (see www.inmatrix.com).



▲ Figure 1: TV-out connections from left to right — composite RCA, S-Video and standard nine-pin VGA

Things get more complex if you want to watch movies on your TV, instead of on your computer monitor. For this, you'll need a video device with TV out.

TV out comes in two varieties: composite and S-Video (or Y/C). The video card in figure 1 has both kinds of connector. The connector on the right is the normal monitor cable connector, in the middle is the four-pin Y/C

connector, and on the left is the simple coaxial RCA composite connector.

Composite video works with everything. Most recent model TVs have a composite connector. Y/C gives better image quality, but it's only supported by high-quality gear. If your video card only has Y/C output — and quite a few do — then you'll need to buy a separate Y/C to composite encoder.

The socket in figure 2 resembles an S-Video connector, but it's actually a dual-mode connector. It carries both composite



◀ Figure 2: The hybrid connector resembles a four-pin S-Video connector, but it has seven pins.

and Y/C output. An S-Video lead will plug into this seven-pin connector, but to use composite, you must plug in the special seven-pin to RCA lead that comes with the card. This lead only works on cards with a hybrid connector.

PAL and NTSC

TV-out video cards sold in Australia should all be capable of outputting video in the Australian TV standard, PAL. Many can also output the US standard, NTSC. DVDs also come in PAL and NTSC.

Neither kind of DVD is a problem for current playback software, but the conversion from NTSC's 30 frame per second

More resources for DVD

CyberLink PowerDVD playback software

www.cyberlink.com.tw/english/products/PowerDVD.asp

InterVideo, makers of WinDVD playback software

www.intervideo.com

DVD Genie region-switching utility information (read the FAQ)

www.inmatrix.com

video to PAL's 25 frame per second is often done by dropping one frame out of every six. This creates noticeable and annoying video stutter. A better solution is to have an NTSC-capable TV — even many basic models can handle NTSC — and change the video mode of the playback system if you're playing an NTSC disk.

Hardware acceleration

Don't get too excited about video cards that claim to have hardware-accelerated DVD playback. Some video cards have hardware MPEG decoding features that can take a lot of the load off the CPU. These include recent ATI models such as the Rage 128 series and the new Radeon. However, most video cards that claim to have hardware DVD playback, only have a small subset of the full decoding feature set. There's nothing hardware can do that can't be done in software, anyway.

Using a dedicated DVD playback card, which was necessary when most people's CPUs weren't fast enough for software playback, might give better quality TV output. It also allows you to use your PC while playing

movies, without any performance loss. But don't feel disadvantaged if you don't have one. A DVD-ROM drive, playback software and a fast CPU are all you really need.

Daniel Rutter



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3	Pro Mos Technologies	Semiconductor	588,655	21	114.63	10
4	VIA	Semiconductor	362,757	43	90.99	14
5	TSMC	Semiconductor	2,359,073	3	45.58	56
6	MSI	PC & Peripherals	509,680	27	64.53	29
7	Ritek	PC & Peripherals	461,728	31	162.96	6
8	Infodisc	PC & Peripherals	117,800	96	264.35	2
9	Sis	Semiconductor	349,687	46	69.34	25
10	Technology	Software	48,027	109	56.2	42

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When APC staffer Laura Kane set out to build a fan Web site she was a Web novice, but she soon overcame the steep HTML learning curve.

Hitching your site to a star

The first encouragement I received to tackle Web design came from APC and Newswire editor-in-chief Angus Kidman. He suggested that I create a fan site for Miguel Ayesa, a friend of mine in the music business. After months of refusing to immerse myself in something so bewildering, I surrendered to the pressure and took up the challenge.

Choosing a look

To help make the Miguel Ayesa Fan Club (MAFC) a reality, I recruited a couple of equally green friends for moral support. We knew we needed to learn HTML, create at least half-decent graphics and decide on a location to host the site. Easy, right?

The plan for the site's content that we finally came up with was pretty basic. We'd use press clippings, pictures and career info about the man himself. We decided to be careful about what appeared online, as we didn't want to compromise Miguel's privacy.

We jotted down our concept and presented it to Miguel. Luckily, it was well received. We weren't keen on producing a site that didn't have the approval of the person it was meant to be celebrating.

After a few tentative lessons in HTML with Angus, we examined the source code behind the sites we liked and attempted to understand their construction. We used a text-based HTML editor by GlobalSCAPE Internet Software called CuteHTML (you can download a demonstration copy from www.cutehtml.com).

We thought CuteHTML was great because it was the first colour-coded text HTML editor we found. It displays each different kind of HTML tag in a different colour for easy reviewing. This feature is a lot more common now and it is an incredibly useful one. Not being keen on reading instructions, we managed to teach ourselves the majority of CuteHTML's features. Handy hints from APC colleagues, and useful beginner's guides to HTML, were a great help as we built a skeleton of what we wanted.

After looking at so many sites, we developed rather grand ideas for graphics. Considering we weren't using much more than a basic photo-editing program, this proved to be a bit of a chal-

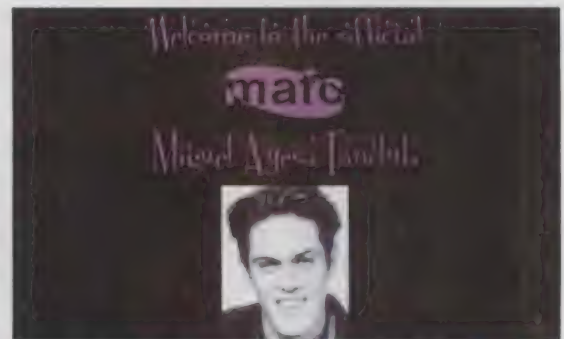
lenge. Looking back, creating graphics for a Web site using only Paintbrush is ludicrous, but amazingly, that's how we did it. We didn't want someone else doing the hard work for us and we were too cheap to take courses on more sophisticated programs. Unfortunately, we were so intent on creating the site as quickly as possible that the graphics we managed to create were only passable. We had to remind ourselves often that this was just the first version of a site that would improve over time as we learned more about graphics and HTML.

We also wanted a guestbook for visitors, and a counter to monitor how many hits our site received. A lot of time was spent researching sites offering free facilities for guestbooks and hit counters. We eventually chose www.bravenet.com, which calculates statistics on your recent visitors (hits, browsers, operating systems and so on). It also offers a truckload of extra features like chat rooms, mailing list databases and site-based search engines.

To complete our 'look', we decorated the site with extra graphics from one of the innumerable free graphics sites that can be found through www.Clipart4free.com. Our favourite additions to the site were an animated GIF of a dancing frog called Lloyd, and an animated rainbow, both of which can now be found on many personal sites.

Maintaining our standards

We soon discovered that the most frustrating part of Web design is creating pages that will display properly within the two most popular browsers, Microsoft Internet Explorer and Netscape Navigator. We also wanted them to work in less popular browsers like Opera. The Web's own version of the United Nations — the



▲ The original MAFC welcome page



▲ When we released version two of the site, mouse rollovers were as big with us as shiny T-shirts and overexposed photographs were with Miguel's publicity agent.



▲ The graphics and navigation on the latest version of MAFC are far more advanced than anything we've done previously.

World Wide Web Consortium (W3C) — has set standards for HTML which can be viewed at www.w3c.org, but there are still differences in the way that browsers read HTML, as each browser developer offers extra features to attract users.

You can alleviate the problem by using programs like A Real Validator (downloadable from www.arealvalidator.com). This checks your code and reports where changes need to be made to decrease your

chances of offending different browsers. You could also use a site such as Webmonkey (www.webmonkey.com), to keep abreast of browser HTML support issues. This site has an invaluable section dedicated to the features that different browsers on different operating systems are capable of viewing. Webmonkey also has an HTML cheatsheet and other nifty references that were indispensable throughout MAFC's creation.

Eventually, we had a product that was ready for public viewing. All we needed was a server to host the site. We preferred not to use a free Web site hosting service such as Tripod or Xoom.com. The last thing we wanted was for our visitors to be bombarded with annoying pop-up advertisements as they explored our pride and joy. Most ISPs offer limited advertisement-free Web space (usually about 10M), but we knew we'd need more than this if we expanded the site as planned. Another option was to pay an ISP to host the site on our behalf. This would be a last resort, as the cost for this service can be very steep: up to about \$300 a month. Thankfully, I was able to host our site on APC's Web server for free, alongside staff Web pages, and with no advertisements.

Naming our baby

The next move we considered was registering our own domain name. This was where we made our worst decision. We didn't shop around for the best deal with domain name registration and went straight to Network Solutions at www.networksolutions.com. We encountered many problems. Network Solutions didn't register our domain properly (thema.fc.com) and it didn't redirect the domain name to the correct IP address of our server. If we'd registered our domain name with one of the many competitors on the market, we would have bagged a much better deal, and received more services and features (see APC September, page 134).

When we were finally able to transfer the site to our server, we put out the word to Miguel fans through various mailing lists and fan sites that it was online. To attract more traffic, we listed MAFC on every search engine site we could think of. This was time-consuming with few noticeable benefits. To target Web surfers more likely to be interested in our site, we also registered with a Webring dedicated to Australian musicians and performers. This resulted in a noticeable increase in traffic.

Overall, the site received a reasonable number of visitors in its early days, considering that Miguel's profile isn't quite as high as Michael Jackson's (yet).

Image makeover

Eventually, we grew tired of the site's original interface, dodgy graphics and slow load times, so we decided on some changes. By then, we'd spent time experimenting with HTML and graphics. We discovered mouse rollover images, multimedia downloads and ways of decreasing the download time for each page. We adopted Macromedia Dreamweaver (a WYSIWYG HTML editor) and Adobe Photoshop (a photo/graphics editor) as our power tools, and came up with a site that was more polished than our original. It had MP3 downloads and almost three times the original content.

Not surprisingly, before we even launched the second version of MAFC, we were ready to redevelop again with a completely new look. As version two went live, we were already workshoping the next release.

We decided that frames were the next step, as well as brand new graphics and an interactive element. We wanted more MP3 downloads, videos, wallpaper and competitions, to generate more traffic. Looking at the previous version of the site, we cringed at the number of errors we found. The grammar was atrocious and there were spelling mistakes all over the place, so we spent time improving the text and making it more fun to read. We simplified our graphics and fell in love with Adobe's ImageReady, which we used to make the graphics and images faster to download.

For some time, we overlooked the legalities of using text, images and sound from other sources. We didn't have a lot of luck finding detailed legal information about this online, but we did find out that if material is used for a nonprofit purpose, and if the source is acknowledged, there should be no legal problems.

While we were developing version 3.0 of MAFC, our server was reinstalled to



run on Domino. This meant that we had to convert our entire site from standard HTML to Domino (Lotus Notes) format. Domino displays HTML, but is slightly more advanced with its execution. We were taught how to use the Domino Designer program while we converted the site. Domino has an endless supply of internal links. It informs you if a particular file doesn't exist and updates links when you rename files. You can also download scripts to create your own add-ons, such as hit counters, forums and guestbooks. Updating is easier than ever and the site is faster to download, which makes it more user friendly.

A flash of the future

The launch of the third version of MAFC received a great public response, and we had lots of positive feedback on its new design and extra features.

The next step is to learn to use Macromedia Flash and create a Flash intro for the site. Web sites featuring Flash are becoming more popular and, most importantly, they look funky when they're done properly. Luckily, APC is home to helpful Flash gurus who have kindly offered to mentor us in the next stage of MAFC's development.

It's been over 18 months since we started developing MAFC. Has it been worth all the effort? I've spent many hours bleary-eyed in front of the PC, and I've had to deal with some pretty weird (and wonderful) people through thema.fc.com, but I have had a damn good time.

Laura Kane



For a complete archive of APC Just DIY columns, see apcmag.com.



Laura Kane can be contacted at lkane@acptech.net.

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*Negotiate Windows 2000's stability/compatibility trade-off
and remove unwanted programs in Windows 98.*

Out the window

Windows 2000

Windows 2000 has been promoted as the most stable Windows yet. However, along with its increased reliability comes a reduction in its compatibility with existing software. Gradually, Windows 2000's problems are being rectified. For the time being, it's important to know what applications are plagued with compatibility problems and how to work around these problems if possible.

Why are there compatibility problems?

A piece of software may be incompatible with Windows 2000 for a number of reasons. Some applications don't install properly, others access system settings and the registry incorrectly, or try to perform actions that are not allowed under Windows 2000.

When it comes to installation, very basic problems can arise. Applications with simple install routines sometimes assume that the Windows folder is C:\windows when Windows 2000 could be installed in a WinNT or Win2000 folder. Poorly written programs that don't take this into account might not work at all.

During installation, many applications check to see what operating system you have and can assume you are using Windows NT rather than Windows 2000. This is a problem because some applications that might not have been able to run under Windows NT might be able to run under Windows 2000. If the application assumes otherwise during installation, it may terminate its setup routine.

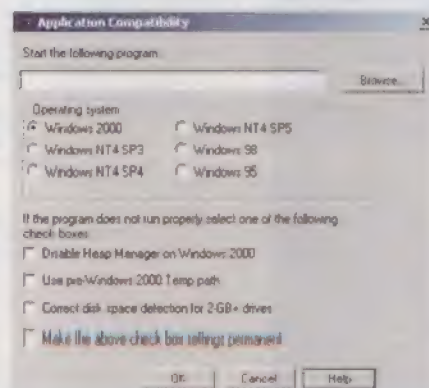
With Windows 2000, Microsoft has introduced System File Protection. This feature prevents certain system files from being changed by other applications, and this can be a problem for some software. Windows allows the installing program to install its own system files into its own directory and allows it to overwrite the same files in the Windows directory. However, Windows 2000 then goes back to replace these 'new' files with the original version. This protects stability, but if the application needs to install its own versions of those system files, it might not work.

Just like its Windows NT predecessor,

Windows 2000 does not allow direct access to hardware. This means that many 16-bit applications and some games will not be able to work. Windows 2000 is a lot less flexible than Windows 98, so software developers have to be more careful when designing software. They must ensure that they do not include any procedures that Windows 2000 doesn't allow.

Since the release of Windows 2000 there have been compatibility problems with hundreds of applications. One of the most recent compatibility problems to affect a large number of people involved Adaptec's popular EasyCD Creator.

At the end of July, people with EasyCD Creator (any version before 4.02) ran into problems after installing Microsoft's Windows Media Player 7 on their Windows 2000 systems. When Media Player 7 is installed on a Windows 2000 system (other operating systems are apparently



▲ Make Windows 2000 pretend that it is an earlier operating system.

unaffected), it overwrites some critical parts of EasyCD Creator and prevents it from running. To get around this problem, you need to install a more recent version of EasyCD Creator or download a fix from Adaptec's Web site.

Despite these compatibility problems, one good thing about the latest version of Windows is that when incompatible programs do cause problems they rarely crash the entire system. Pressing Ctrl-Alt-Del, and opening the Task Manager allows you to quickly terminate any troublesome programs. Also, unlike Windows 98, when you terminate a program, all associated processes that are causing problems are terminated as well; you don't have to end each process individually.

Windows 2000 must sacrifice some

degree of compatibility to maintain stability. When developing Windows 2000, Microsoft developers always said that first and foremost they were aiming for a stable and reliable platform, and that compatibility would become the focus later. There are numerous pros and cons associated with this trade-off, but in the end they balance out.

Testing your applications

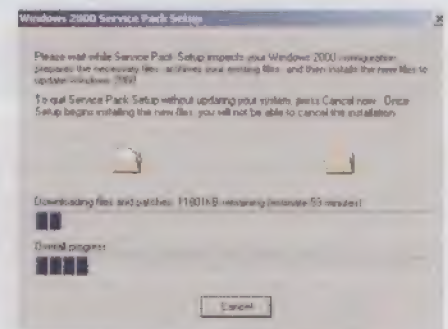
Whether you have already upgraded to Windows 2000 or are planning to do so, you might want to find out if certain applications are compatible with your new operating system.

There are three main ways to find out if an application will run smoothly under Windows 2000: you can check what programs are Windows 2000-certified at Microsoft's Web site; you can download the Readiness Analyser and run it on your system; or you can visit the software developer's Web site.

Microsoft's Web site maintains a list of Windows 2000-certified software. Go to www.microsoft.com/windows2000/upgrade/compat/default.asp.

To receive this Windows 2000 certification (and a Windows 2000 logo), an application must undergo testing by Microsoft. For this reason, the number of Windows 2000-certified applications is reasonably low. If you come across software that is labelled Windows 2000 compatible, this means that the developer tested it under Windows 2000, but it hasn't been 'officially' certified by Microsoft.

You can download a Readiness Analyser program from the Microsoft site, and it will tell you what problems you could encounter with a Windows 2000 installation. After completing its



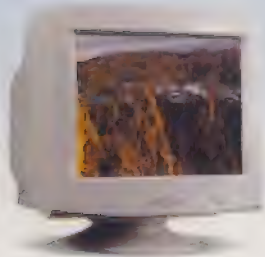
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tests, the Readiness Analyser reports on which applications will be incompatible, or at least problematic.

The tests performed by the Readiness Analyser are also performed during the installation of Windows 2000. But if you want to run the same tests on your system before installing the operating system, you can download the program from www.microsoft.com/windows2000/upgrade/compat/ready.asp.

The final way to check software compatibility is to visit individual developer Web sites. Most major software developers maintain a Web page that lists which of their products are compatible with Windows 2000 and which ones require additional patches.

What about games?

Many gamers will not install Windows 2000 for fear of game compatibility problems. Windows 2000's compatibility problems can affect some games, but others will run fine. As mentioned earlier, Windows 2000 does not allow software to directly access hardware. This causes a lot of problems for games, especially older DOS games (most of which are inoperable under Windows 2000).

Before Windows 2000, the operating system of choice for gamers was Windows 98. For serious business applications, the operating system to use was NT. Now that Windows 2000 has incorporated Windows 98's multimedia gaming features, many people are considering a changeover to the more stable operating system.

As Windows 2000 ships with DirectX 7.0, any 32-bit games designed for this API (Application Programming Interface) should work. Microsoft is also releasing updates to fix problems with certain games.

There are Web sites that report on compatibility issues between games and Windows 2000. APC recommends two: www.win2kgames.com and www.ntcompatible.com.

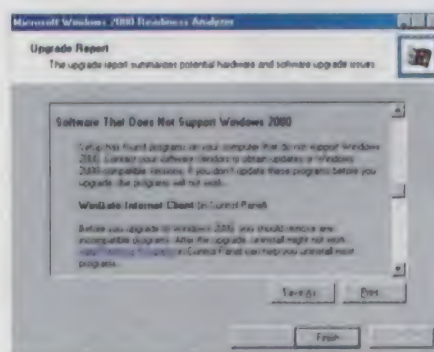
Making your applications work

What can be done to minimise or resolve compatibility problems? First, install the latest compatibility update from the Windows Update site: windowsupdate.microsoft.com. These updates are continually revised as compatibility problems arise. At the time of writing, the most recent update available was May 2000, and it included fixes for applications like Access 97 and Outlook 98,

along with fixes for games like Demolition Racer and Panzer Commander.

The Windows 2000 CD provides a useful tool for assisting with compatibility problems. The Application Compatibility Tool can be found in the support folder on your installation CD. It is also part of the Application Compatibility Toolkit which can be downloaded from msdn.microsoft.com/compatibility.

The Application Compatibility Tool attempts to convince programs which perform compliance checking in Windows 2000 that they are running under an earlier operating system. The application won't run if it is operating system specific, and performs illegal actions such as directly accessing hardware or attempting to use Windows 95/98 virtual device drivers.



▲ Check to see if you will have any problems with your software.

After loading the APCOMPAT.EXE file you can use the program in a number of ways. First, you must click Browse and select the EXE file for the program you want to run. For many applications, the only setting you need to specify is which of the earlier operating systems Windows 2000 should pretend to be.

If errors occur while running an application that didn't exist when you ran the program under earlier operating systems, this might be the result of a conflict with Windows 2000's improved memory management. By selecting the 'Disable Help Manager on Windows 2000' checkbox you will avoid memory management conflicts, but overall memory use will become less efficient.

The setting labelled 'Use the pre-Windows 2000 Temp path' allows programs to use an alternative temp folder if the default temp folder proves inaccessible. If you get error messages telling you that there is insufficient disk space when you know that there is plenty, you should enable the 'Correct disk space detection for 2GB+ drives' checkbox.

The Application Compatibility tool will not solve all compatibility problems, but if

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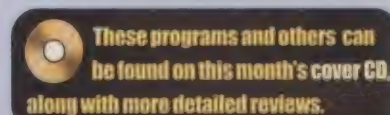
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it does solve your problems you might want to make your changes permanent. This can be done by selecting 'Make the above checkbox settings permanent'.

Service pack one

The first service pack for Windows 2000 was made available to the public on July 31. It addresses a variety of issues including operating system reliability, application and hardware compatibility, and some security fixes.

There are two ways to obtain the service pack. You can download the necessary components (about 13M) from www.microsoft.com/windows2000/downloads/recommended/SP1. Alternatively, you can order the service pack on CD for \$15.34. Orders can be placed at www.datacom.com.au/store. Microsoft will not give computer magazines like APC permission to distribute the update on their cover CDs.

Kieran McNamee



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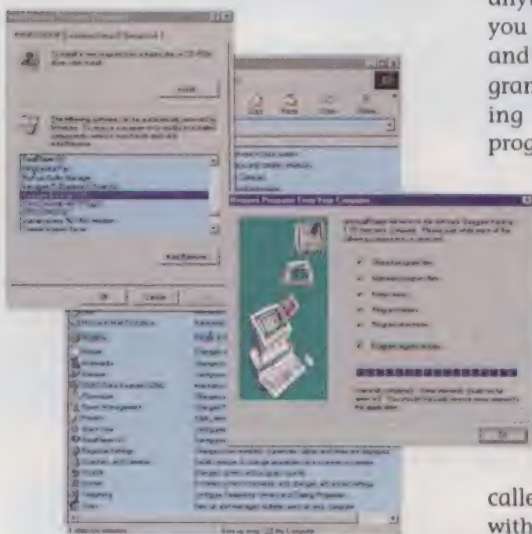
Windows 98

It can be downright irritating trying to remove unwanted shareware and other programs in Windows 98. Microsoft addressed this issue with the introduction of InstallShield as a standard way of removing Windows programs, but this program and its activator, the Add/Remove Programs option in the Windows Control Panel, almost never get it right.

This isn't always Windows' fault. Many programs leave files that aren't really covered in uninstall routines. This often happens for good reasons, but the detritus takes up disk space and slows your system unnecessarily.

Search and destroy — carefully

Before deleting any program, it's a good idea to look in its directory to find the date and time of the program files. This is usually set by the manufacturer and can help identify which files were installed together. For example, all of the Windows system files on APC's test machine are



dated 11/05/98 at 19:01. Some other programs note the date and time that files were actually installed, which should produce multiple files within a few minutes of each other. This information is important, so write it down and keep it close by.

Now you're set to go ahead and uninstall the program. For the uninitiated, this is performed using Windows' built-in uninstall utility. Select Settings and then Control Panel from the Start menu. Then click the Add/Remove Programs icon, highlight the program you want to erase, and click on Add/Remove.

If your uninstall works smoothly, you've done well, but if things go wrong — as they

do with annoying frequency — you'll get an error message. This is often a query as to whether you want to delete certain DLL, OCX or other system files, but despite Windows' caution, it's usually OK to delete all such programs by clicking 'Yes to All'. If you're the cautious type, write down each filename the program asks you about and click 'No' to each one. Now go into the Windows system directory (C:\Windows\system), delete one at a time, and reboot your system after each deletion. Testing your major applications will reveal any problems, and you can restore the deleted file from the Recycle Bin.

More often, Windows reports that an item related to the applications needs to be removed manually. APC encountered this message after uninstalling Seagate Backup 1.15, which we'd been using for regular tape backups, but which had become redundant since the recent installation of a CD-RW drive. It was located in a directory called C:\Program Files\Seagate Backup, which was still hanging around in the Program Files directory after using the Windows uninstall technique.

If you're absolutely sure you don't need anything remotely related to the program, you can simply delete the main directory and everything underneath it. Many programs default to installing in folders bearing their brand name and include the program as a subdirectory. In this case, you can delete the folder named after the company, unless you have installed another tool from the same company.

If you're concerned that the uninstallation process didn't finish because it didn't delete things you want to keep, open some of the files to get a sense of what they contain. In APC's case, the Seagate Backup directory still had a subdirectory called SYSTEM, which contained nine files with extensions including RPT, ACF, APF and EXE. Often, leftover files have no obvious meaning as their file types are unregistered within Windows.

To figure out whether these files are important, right-click on them, select the Open with . . . option, and scroll down until you can double-click on NOTEPAD. Be sure to uncheck the option 'Always use this program to open this file' or you will create an unnecessary file type association. Once you've opened the file, you should get a good sense of what it is, but many files may have binary content represented by solid black squares or other

strange symbols. In APC's case, the RPT files seemed to be reports related to specific backup jobs. This was interesting, but irrelevant now that the tape drive is gone.

In most cases, you're not likely to need the programs, and can delete them along with any leftover program files. But what if you want to keep them — for example, if you want to save your Quake III characters for use on another computer? As such files can live in many different subdirectories, your best bet is to use an archiving program like WinZip to store the files along with their directory structure. In WinZip 7.0, do this by clicking the 'Include subfolders' and 'Save extra folder info' boxes in the Add dialog. Be sure to tick 'Use folder names' when extracting them later.

To the ends of the hard drive

Deleting programs is just the beginning. Once you've saved the information you want to keep, and deleted the whole shebang, there are still several places to look for rogue bits of your application.

Often, desktop icons and Start menu entries can outlast an undelete, particularly if you've changed the name of the shortcut you use to launch the program. Find them by manually searching through your desktop and Start menu, then use the Delete key to get rid of them.

Another place to look for leftover files is in the C:\Windows and C:\Windows\System directories, where many programs install helper files they think the system might want to use as well. This is a horrible but common programming habit, and quickly leads to unnecessarily cluttered directories.

You don't want to haphazardly delete files in these directories, but sometimes leftovers are very obvious. To spot some, sort the directories in date order by clicking on the Modified button at the top of the Explorer window, then scroll down until you can see the files created on or around the date you wrote down earlier.

Look for obvious signs that those files are related to the application you just deleted — for example, you might check for files with strings such as 'sea', 'sgtbk', 'bckp' or anything else related to the name Seagate Backup. Delete any obvious matches, but make sure you test your other programs after doing this so you can restore any files if you need them later.

David Braue

David Braue can be contacted at david@braue.com.



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Searching and regular expressions — finding things is easy when you know how to ask.

What's the question?

This month, we look at how searching is commonly performed under Linux using regular expressions (sometimes abbreviated to regex or regexp). Regular expressions might not seem very regular to the uninitiated, but it's worth learning a bit about them as they're commonly used to tell Linux what to find.

The most obvious example of a program that accepts regular expressions is grep, but vi, more, less, sed, awk and perl (among others) also accept regular expressions for searching.

Simple regular expressions

The simplest regular expressions are *fixed strings*. To search a file for the word 'bass', for example, you can type `grep bass myfile`; grep's default behaviour is to display each line from the file that matches the regular expression, ignoring the lines that don't. This behaviour can be modified; we discussed a few commonly used grep switches last month.

Searching for fixed strings is useful, but regular expressions are far more powerful than that. Most characters in a regular expression match themselves. This means that if you put a *k* in the regular expression, grep will look for the character *k*. This might sound obvious, but not all characters behave this way. If you place a full stop (.) in your search string, grep will find more than you expect. These exceptions to the rule are called *metacharacters*.

Wildcards

The full stop metacharacter will match any single character, so if you type `grep . myfile`, grep will show you any line with at least one character on it (that is, any line that isn't blank).

Metacharacters can be combined with regular characters, so `a.b` matches any instance of an *a* followed by *b* with exactly one character in between. These search criteria would match unambiguous, ambidextrous and Saab, but not Saba, above, vagabond or standby. For those familiar with shell wildcards, the regular expression of the period (.) is the equivalent of the shell's question mark (?) wildcard.

The square bracket ([and]) characters are also equivalent to those in the shell. They can be used together to match any one of a list of characters. To search for

either a 1, 3 or 7, you can use the regular expression [137], and to find instances of *c* or *b* followed by *rw*, you can use the regular expression [cb]rw. If you are searching the output of `ls -la`, this finds all character or block devices that are readable and writeable by the owner. You can also specify a range of characters with an expression like [a-f0-3] to save you laboriously typing [abcdef0123]. If the hyphen is one of the characters you are looking for, place it at the end like this [a-z-].

The shell has its own set of metacharacters (which include square brackets as mentioned), so you need to be careful to use quoting when appropriate. For example, if you are searching for any digit ([0-9]) in a file, and some files in your current directory are named with a single digit, the shell could interpret `grep [0-9] myfile` as `grep 0 1 2 myfile`, which would search the files 1, 2, and myfile, for the numeral 0 — obviously not what was intended. To prevent this from happening, place single quotation marks around any regular expression that is not a simple fixed string. See the example below.

```
grep '[0-9]' myfile
```

You can also search for any character not specified in your list by using a carat (^) as the first item in the list. Therefore, [^0-9] would mean 'any single character that is not a digit'.

Repetition

Unlike the square brackets and period, the asterisk character (*) in a regular expression has no equivalent in the shell. An asterisk in a regular expression denotes 'any number of the immediately preceding item'; so 5* means zero, one, two or more instances of the number 5, and [a-z]* means 'any number of lower-case letters'.

Any number includes zero, so searching for *a** will match everything, since any line contains either zero, one, two or more instances of the letter *a*. Because of this, the * is usually only useful in the middle of a regular expression. For example, to find all instances of the word 'hello' followed by the word 'world' on the same line, with anything in between, you can use the expression `hello.*world`. If you want to make sure that there is at least one space between them, you can use `hello.* world`.

Anchors

Occasionally you encounter a regular expression beginning and/or ending with a period followed immediately by an asterisk (such as *.hello.*). If this is only being used for searching (and not replacing), simply using `hello` is a more efficient way to achieve the same results. This is because by default a regular expression will match anywhere within a line.

To search for a string, but only match it if it appears at the start or end of a line (or both), use the ^ or \$ characters respectively to anchor the pattern. For example, ^start will match start at the beginning of a line, while start\$ will match start where it occurs at the end of a line. You can use them both together ^like this\$, which will only match lines that contain exactly that.

The following example will search /etc/inetd.conf for any lines that have not been commented out (that is, do not begin with a #). It lets you know what networking services are being supplied by inetd.

```
grep '^[^#]' /etc/inetd.conf
```

Crossword help

Most Linux distributions contain a words file which is a list of about 45,000 English words. This file is usually named /usr/dict/words or /usr/dict/linux.words. Along with what you now know about regular expressions, you can use it to help you with crossword puzzles. For example, to find all words that begin with *a*, have *c* as the third character, end with *l*, and are 9 characters long, you could use the grep command line below.

```
grep '^a.c.....l$' /usr/dict/words
```

Using the output of this command, you can choose between accentual, ancestral or archangel.

Similarly, you can use this command line to help spell a word if you don't have a word processor with a spellchecker handy. If you know the word 'rhythm' begins with *r*, has a *y* in it somewhere and ends with *m*, type the command below to locate it.

```
grep '^r.*y.*m$' /usr/dict/words
```


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Quoting metacharacters

To search for a metacharacter itself, place a backward slash (\) just before that character, to turn off (escape) its special meaning. For example, to search for a full stop followed by something other than a space, use `\.[^]`.

Imagine you have a file containing a list of filenames, and you want to see all files in the list that have a full stop in them, but only if that full stop does not occur at the start or end of a line. In this case, use the search expression `\.`, which translates to 'any single character followed by a period, followed by another single character'. The trick is that if there is a single character on both sides of the period, the period cannot possibly be at the start or end of the line.

Word boundaries

A text file search for the word 'bass' will also find the word 'ambassador' because it contains the string of characters 'bass'. To remedy this, you could put a space either side of your search string, but you would then not find the instances of 'bass' that occur at the start or end of a line. To match whole words, `grep` has two metacharacters, `<` and `>`, which match the beginning and end of a word respectively.

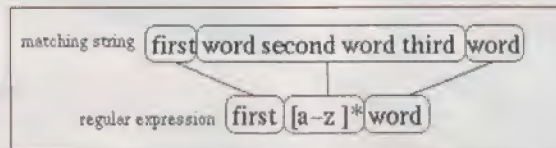
When the backslash (escape) is used in conjunction with `<` and `>` they work in the opposite manner to most metacharacters. By themselves, `<` and `>` will match `<` and `>` literally. They require a backslash (\) in front of them to turn on their special meaning. For example, to use them to search for the word 'bass' instead of the four characters b-a-s-s, use:

```
grep '\<bass\>' myfile
```

Using regular expressions with interactive programs

As mentioned at the beginning of this article, regular expressions are used in programs other than `grep`. For interactive programs like `more`, `less` and `vi`, the search mode is usually entered by pressing the `/` (forward slash) key. You enter your regular expression and press Enter. Each of these programs supports the `n`-command which will repeat the last search performed.

If you're using `less` or `vi` and you press the `n` key too many times, typing upper-case `N` will search backwards through your file to find previous matches to your search. If you want to start searching backwards, you can use the question mark (?)



▲ Figure 1: Matching a string against a greedy regular expression

instead of `/` (in this instance using a lower-case `n` will continue searching backwards, and an upper-case `N` will search forwards).

In `vi`, the forward slash (`/`) character is considered a metacharacter, so if you want to search for the string `/etc/passwd`, type `Vetc/passwd` instead. As you can see, there are a few slightly different regular expression implementations. What is a metacharacter in one program might not necessarily be one in another.

Greedy regular expressions

As a regular expression, the asterisk (*) is known as a greedy metacharacter, which means that it will match as many characters as it can. This is not terribly important when only searching, but it can cause problems when doing search and replace operations.

Figure 1 shows a sample line ('first word second word third word') being matched against the regular expression `first[a-z]*word` (broken up for clarity in the figure). The first part of the regular expression will obviously match the first part of the sample line. The second part, `[a-z]*` will match any number of lower-case letters and/or spaces. Since the last part of the regular expression (`word`) matches the line in more than one place, there is an ambiguity. To alert you to this ambiguity, the asterisk is described as greedy. As you can see in figure 1, it will match as much as it can.

The table to the right summarises the most common metacharacters available in regular expressions.

Summing up

Here we've looked at regular expressions, which are a widely used, powerful and concise (sometimes a little too concise) way of expressing a pattern to search for. For further information on regular expressions, the manual page for `grep` (type `man grep`), the info page for `grep` (`info grep`), and the manual page for `regex` (`man 7 regex`) may be useful. However, most of the information in these files is reference material rather than tutorial, so it can be difficult to learn from.

Geoffrey Bennett

Geoffrey Bennett can be contacted at geoffrey@netcraft.com.au.

Common metacharacters

.	any single character
[abc]	any single character in the list
{^abc}	any single character not in the list
*	any number of the preceding item
^	start of line
\$	end of line
\	escape any of the above metacharacters
\<	beginning of a word
\>	end of a word

Linux freeware

PHP-Nuke

This simple yet comprehensive Web portal and online community toolkit is simple to use, and can produce a highly effective portal site.

Blender 1.80

This 3D modelling and animation package for Linux supports all common 3D modelling applications and more.



Microsoft Freecell

This popular Microsoft game has recently been ported to Linux using Mainsoft MainWin for Linux.

KMPS 0.13

This is an early beta for a DivX player for Linux. (DivX is an MPEG-4-based video format.)

ASP2PHP 0.75

You can use this program to convert Microsoft ASP (Active Server Pages) into PHP (Professional Home Page/PHP Hypertext Preprocessor) pages.

These programs and more can be found on this month's cover CD, along with more detailed reviews.

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Use your Palm's infra-red port to make light work of data synchronisation.

Beaming back atcha

In the last issue, we looked at how to use the infra-red port on your Palm to communicate with a mobile phone (see *APC* October, page 158). This month's PDA column shows you how to use the infra-red port with the other built-in Palm applications, and examines third-party programs. Some examples of these third-party infra-red applications will also be included on this month's cover CD.

The infra-red port allows your Palm to communicate with other Palm PDAs and other infra-red devices that conform to IrDA standards. This includes Palm devices and PDAs running on foreign platforms, PCs, TVs, VCRs, stereos, mobile phones, printers, and even children's toys like the Furby. With the exception of other Palms, Windows 98 and some mobile phones, additional software is required to turn your Palm into a remote control unit or to communicate with other devices. However, its potential is almost limitless.

Built-in applications

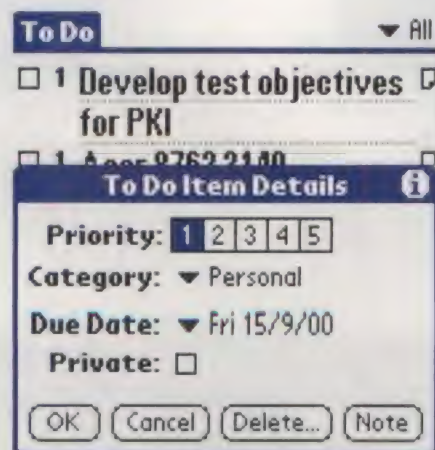
The built-in infra-red communication or 'beaming' features of the Palm allow you to send notes, to-do items, addresses, appointments, and applications to other Palm recipients. Beaming your own electronic business card or a cool new shareware program you've just discovered to a friend are probably most popular.

The setting to receive data from your infra-red port can be turned off inadvertently, so make sure you run the Preferences application, select the General pull-down menu in the upper-right corner of your screen and check that the Beam Receive item is set to On.

If you have a laptop running Windows 95, 98 or 2000, you might find that when you turn your Palm on anywhere near your laptop, it will automatically attempt to connect to it and become difficult to work with. Even if your laptop's infra-red port isn't facing your PDA's, this can still be a problem. Light beams can still find their way to your laptop by bouncing off nearby reflective surfaces. You may need to turn this feature off temporarily or disable it on your laptop.

Infra-red data exchange between two Palm devices is straightforward and intuitive using built-in Palm applications. For example, push the Datebook button, tap on the Menu silkscreen button and select Record. Once you have selected the item you want to beam, just tap on the Beam Event menu item and point your Palm devices at each other.

This also works for the To Do function, but you can beam an entire category, not just an individual to-do item. To use the category beaming function, you need to file your items into different categories by selecting the To Do item, tapping on the Details button, tapping on the Category pop-up list and selecting a category to file your information into. If a suitable description is not present, you can edit the list and add your own entries. This function is a powerful way of sorting and filtering information and can be used with all of the built-in applications.



▲ Beam entire categories in the To Do function

Its benefits go well beyond infra-red beaming, and you might find that sorting items by categories makes working with the Palm much more effective.

To beam all memos in a category, run the Memopad application, select a category to beam from the upper-right Category pull-down menu, tap on the Menu button, and select the Beam Category option. This is a great feature, but more often than not you'll just want to beam a single memo to a friend. Open the note that you want to send, tap on the

PDA shareware

Palm Remote

Use this universal remote control to manage your TV, VCR and stereo from your Palm or Windows CE PDA.

Peacemaker Professional

Now you can transfer contacts, business cards, appointments, tasks, memos and files to Palm PDAs from your Pocket PC or Windows CE PDA.

PhoneManPro


Send and receive SMS text using your Psion and mobile phone with this program.

FunSMS

Use this program to write and send SMS text using your Palm and mobile phone.

PocketTV

This program allows you to watch standard MPEG-1 video on your Pocket PC or Windows CE PDA.

 All these programs and more can be found on this month's cover CD, along with more detailed reviews.

Menu button, select the Record pull-down menu and choose the Beam Memo option.

Here's my card

The Address book application works in much the same way, but it has an extra feature that allows you to send predefined business cards. You can exchange categories and individual address cards using the methods described above, but sending an electronic business card requires additional steps.

Before you can send your personal business card, you'll need to create a special entry. If you have an existing entry with your personal information, you



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might not want to use it for this purpose, as it might contain personal information that you don't want to send out to all and sundry on a business card.

Once you create what you want your card to display, tap on the Menu button,



▲ The address book application has an extra feature that allows you to send business cards.

select the Record pull-down menu and tap on the Select Business Card option. From this point on, if you choose the Beam Business Card option it will send the select card by default. One great shortcut for this is to press the Address book button and hold it for two to three seconds. This automatically starts beaming your business card to other handheld devices. It works well with Palms, mobile phones, and CE and Psion PDAs (if they're running add-on software).

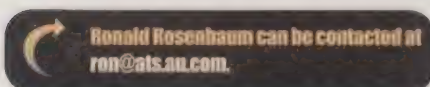
If you've got an appointment, note or to-do item selected, you can enter /b, using graffiti to activate the shortcut for beaming data.

Guiding light

It's important to remember that fluorescent or bright light can interfere with infra-red transmissions. Also, if you're trying to send data from one of your Palm apps to another Palm, PDA or phone, the maximum distance between devices is about 1.5 metres, depending on the lighting situation.

If you're using the Palm as a remote control for your home appliances, you might get a slightly better range, as the infra-red beam is carrying far less complex information and won't be as susceptible to signal loss.

Ronald Rosenbaum



Getting the message — using Pocket PC to collect your email

First, you'll be required to get the following information from your ISP.

Internet connection	Internet mail
Dial-in number	POP3 username
Username	POP3 password
Login password	POP3 server
Primary DNS	SMTP server
Secondary DNS	
Proxy server (if your ISP uses one)	

Code	Explanation
G	Your ISP's dialin number
F	Area code (if required)
E	Country code (if required)
#	If you're behind a PABX system, you need to use this number prefix to gain access to an outside line.
" "	Usually used in combination with #, the comma creates a pause in the dialling process that gives your PABX system time to issue a dial tone to your phone line.

Setting up a data connection to your ISP

Click the button entitled Start (located on the top left-hand corner of the screen). Now click Settings and select the Connections tab. Double-click the Modem icon, select New Connection and name the setup (for example, My ISP).

Select the appropriate communication tool, whether it is an infra-red mobile phone or Compact Flash modem card. Now set up the baud rate to 115.2Kbps to ensure a high-speed connection. Next, click Advanced and choose Name Servers. Enter the information your ISP gave you in the appropriate fields. Click OK and then Next.

Enter the correct country and area code, and then enter your dialup number in the field marked Phone Number. Click Next.

To ensure a connection, remove the tick from the 'Wait for dial tone' box and try adding an extra dial string. Type ATZ — this will allow the modem to dial out if you have an international modem.

Now click Connections and then New Connection. Type in your username and login password.

Now click Dial Properties and fill in the appropriate country and local codes.

Click Edit and enter your dialling information using one of the formulas below.

#G — Local dialling

#FG — Long-distance dialling

#EFG — International dialling

Once you've finished entering your dialling details, click OK twice. You should now be able to connect to the Internet.

If your ISP uses a proxy server, open Internet Explorer and select Tools from the File Menu. Go to Options and select Connections. Tick the box marked 'Use proxy server' and type its address. Click OK and you are ready to browse the Web.

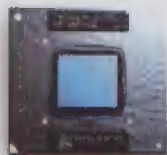
Internet mail

Run the Inbox program located in Programs under the Start menu. Select Services and click New Service. Under Service Type choose POP3 mail, you can now name your inbox under the service name (for example, My Mail). Click Next and choose the connection you created earlier. Type the POP3 server information you collected from your ISP into the Server box. Now type the POP3 username and POP3 password.

The next screen is for user preset selections; they're self-explanatory. When you've finished, move to the final setup screen by clicking Next.

If you select 'Message headers only' from the following screen, the mail program will only download your emails' header information, leaving the body of your emails at the server to be picked up at a later time. This option allows you to preview your mailbox and retrieve your emails selectively. If you choose 'Complete messages', the mail program will download the entire contents of your mailbox. This is dangerous if you do not have a unit with plenty of storage capacity. Few PDAs do. Click Finish and your email service should be ready to go.

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Generate customisable system reports
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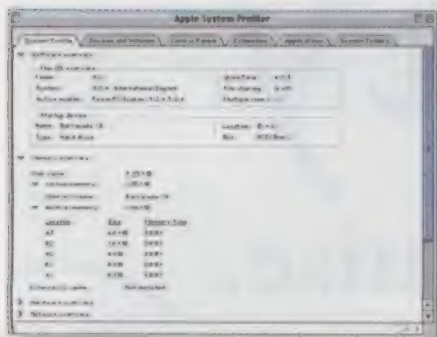
Mac report card

Apple System Profiler is handy for investigating the state of your computer, as it gathers a variety of information in one place. Instead of digging through control panels and programs, run Apple System Profiler (ASP) for a single, neatly formatted report. By default, you'll find ASP in the Apple menu.

When you launch ASP, there is a pause while it collects information. The first (and default) tab shows a basic system profile. This contains essential information about the operating system, startup device, memory, networking and other hardware. It has an outliner-style interface: click on right-pointing arrows to see more detail.

The software overview identifies the version numbers of key operating system components and highlights whether File Sharing is running or not. It would be better if the state of Web Sharing were shown here too, but it's in the network overview section.

The memory overview tells you how much real and virtual memory you have, which volume is used for virtual memory, whether a level 2 cache is fitted, and which RAM slots contain what type of memory. The latter is important, as some models support interleaved memory for faster performance. This feature is only functional when DIMMS are installed in pairs. The ASP report in figure 1 indicates that the first 16M of RAM have been installed as a pair of DIMMs, but the remainder haven't.



▲ Figure 1: ASP shows how much memory you have and how it's configured.

Another performance issue is the volume used for virtual memory. If more than one drive is connected, the volume should be located on the fastest drive available.

The information presented in the hardware overview might be obvious, but it can reveal if your system has been tampered with. The June issue of *AUSOM News*, the

Melbourne-based Apple users group newsletter, reported that a member's computer changed from a 603e to a 603 CPU in mysterious circumstances.

Network overview provides details of the AppleTalk and TCP/IP setup, such as the default zone and IP address. The TCP/IP domain might be truncated to 24 characters, so beware of relying on this information (for instance, a .com.au name 27 characters long would be reported as being in .com). On some computers, ASP also reports on the Ethernet interface and internal modem.

Clicking on the Devices and Volumes tab reveals a detailed view of items connected to the USB, SCSI, ATA and PCI interfaces, plus any floppy drives and (in the case of recent PowerBooks) expansion bay devices. This is a good way of identifying driver versions, drive serial numbers, whether particular volumes are being shared and the format (typically HFS or HFS+) of each volume.

The Control Panels, Extensions and Applications tabs generate a catalogue of the corresponding types of software. The first two produce a listing similar to that in Extensions Manager, but don't allow items to be enabled or disabled. By clicking on the corresponding header, the list can be sorted by name, version, file size, whether the software comes from Apple or whether the item is enabled.

By default, these three sections only search the startup volume. To widen the search, choose Search options from the Commands menu, and in the resulting dialog, select the volumes you want searched. This is especially useful for generating an Applications report, but there is a drawback. Every application is listed, including self-extracting archives, self-mounting disk images, installers, updaters, AppleScripts saved as applications, older control panels with the type APPL instead of APPC, and documents packaged as applications (for example, DocMaker or PageBoy files). It would be useful to be able to filter out applications based on their creator, but Sherlock only allows the exclusion of one creator at a time.

The final tab, System Folders, locates all system folders on the selected volumes. Multiple system folders are usually seen as unsafe, but it is usually safe to keep an old system folder on a computer that has been upgraded. Utilities such as Conflict Catcher can be used to activate or 'bless' a

Mac OS shareware Amadeus II 2.4

This comprehensive sound acquisition, manipulation and analysis tool can handle large sound files.

FretPet 2.14

Use this program to compose and play music for the six-string guitar.

MP3 Rage 2.8

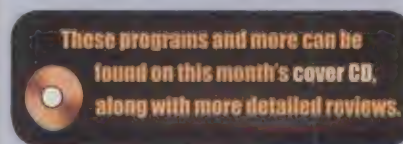
This definitive collection of tools includes a Napster search agent and other tools.

MusicMatch JukeBox 1.0b

A free MP3 player, it offers MP3 encoding, playback, playlists, CDDb and downloading to hardware players.

Virtual Composer 2.3

This program can write and print polyphonic music, then play it back with a variety of instruments.



particular folder. The only problem caused by multiple system folders that APC has experienced lately, was an inability to reindex individual folders in Sherlock. A particular library could not be found, but emptying the Trash (which contained a duplicate system folder) restored normal operation. Beginners sometimes accidentally duplicate the system folder, and this wastes a couple of hundred megabytes.

ASP is mainly used to provide diagnostic information to technical support specialists at Apple or third-party providers. For this reason, you can save the report. Choose New Report from the File menu, select the information you need and click OK. Once the report has been generated, choose Save As from the File menu and save the file. The report is saved as a text file, but there's a good chance that it will be too big to be opened by SimpleText. If you don't want to

reopen the report in ASP, you'll need to use a word processor or other application capable of handling large text files.

The text view displays some extra information. The hardware overview section includes the nanokernel version, pool extends and the number of scheduled CPUs.

Scripting ASP

ASP is scriptable, but AppleScript support in version 2.4.4 is patchy. For example, the `StartupDiskName`, `StartupDiskType`, `StartupDiskLocation` and `StartupDiskBus` properties are all accessible, but when APC tried to use other properties listed in ASP's dictionary, a 'not defined' error occurred.

A way around this problem is to have the script save a text report, then open that file and extract the required information. The script in listing 1 is a modification of some code to collect hardware serial numbers that was posted to the Mac Lab Managers mailing list by Darryl Rosin of Griffith University.

This script displays the version of the System file in the active System Folder. In practice, the script takes action based on the ASP report, instead of just displaying it. You will need to create a dummy file called `ASPReport` before running this script for the first time. Better still, modify the script so that it creates the file before running ASP.

To change the script to collect different information, you'll need to modify the report contents clause. To do this, examine ASP's AppleScript dictionary to find the permitted values. For speed, use only the parameter(s) necessary to get the system information you require. You'll need to alter the number following the word `item` as follows to correspond with the line number in the report that has the value you want.

```
set OSBig to item 6 of ASPReport
```

You should also alter the number following the word `text` in the line reproduced

Listing 1: Scripting Apple System Profiler with Apple Script

```
set ASPReportPath to alias "Macintosh HD:ASPReport"
tell application "Apple System Profiler"
    activate
    make new report at beginning with properties ~
        (report contents:{software overview}, report view format:text)
    save report 1 in ASPReportPath
    close report 1 without saving
    quit
end tell
open for access ASPReportPath
set TempFileRef to result
read TempFileRef using delimiter "
" as list
set ASPReport to result
close access TempFileRef
set OSBig to item 6 of ASPReport
set OSSize to (count OSBig)
set OS to text 11 thru OSSize of OSBig
display dialog OS
```

below, which will target the line position where the value you require is located.

```
set OS to text 11 thru OSSize of OSBig
```

These values are determined by inspecting the ASP report. For example, to get the version number of Finder, you need item 5 (line 5 of the report) and text 11 thru OSSize to reflect the information's location on line 5. It is also sensible to change the names of the variables from `OSSize` and so on, to something that indicates the information you are taking from the report, or to something more generic.

One problem with this method is that the line number on which a certain piece of information falls may vary. For example, the Memory Overview contains one line for each SIMM or DIMM installed. Consequently, you can't be sure of the line number of any information that appears later in the report. To minimise the chance of this problem occurring, generate reports containing as little information as possible. The line reversing the order of the lines allows you to effectively count lines backwards from the end, which may avoid a variable-length section. To do this, insert the following line before manipulating the report.

```
set RevASPReport to reverse of ASPReport
```

Related tools

ASP gives you a lot of information, but what if you want to know more? There are

complementary utilities available. One is Gauge Pro, which displays the speeds of the CPU and system buses, the backside cache bandwidth, and (on systems with appropriate hardware) the CPU temperature. Another is I Love Native, which identifies PowerPC, 68K and fat software. There is also PCIprober, which reveals additional information about your PCI cards (for example, it can see that an Adaptec Ultra HotConnect 8945 is a combination SCSI and FireWire interface, where ASP just sees a SCSI card).

Credit where it's due

As with other Apple products, the names of the people behind Apple System Profiler have been removed from recent versions. In version 2.2 the About box listed nearly 100 names, including Australia's Quinn (aka The Eskimo). However, by version 2.4.4 all that's left in the About box is the version number, the release number of the version of the MacApp framework used to create the program, and an Apple copyright notice.

This was reportedly instigated by Steve Jobs, on the basis that the people who work directly on a particular product are supported by others within the company, and as it isn't practical to name everyone, nobody's name should appear. This ends a long tradition that began with the signatures of the original Macintosh team being moulded inside the computer case.

Stephen Withers

Online references

Gauge PRO 1.0.2


www.newer-tech.com/software/software.html

I Love Native

www.dragonone.com/pages/mac-os/native.htm

PCIprober

hyperarchive.lcs.mit.edu/HyperArchive/Archive/info/hdwr/pci-prober-20.hqx

 For a complete archive of APC Mac OS columns, see apcmag.com.



Stephen Withers can be contacted at swithers@ozemail.com.au.

Mailing out

Over the last couple of months, Insite has been looking into using an Access database to store user information for an online mailing list. To complete the mailing list application, you need to be able to send email to your subscribers from the site. You can manually copy a list of addresses from your site into a mail client such as Outlook Express, but the pages you'll be creating this month enable you to type or paste your message into an HTML form. Then, when you click submit, another Active Server Page (ASP) will do all the list management and mail sending for you.

Install the mail component

ASP does not have any email capabilities. Instead, you need to install an email COM object that you can manipulate with ASP code. There are many commercial email components available for ASP, but there are also several good ones that are free. One of these is SA-SMTPmail, which we will use in our example. This component can be downloaded from www.softartisans.com and must be installed on your Web server. This will involve stopping and starting the Web service, and maybe a reboot.

Using a mailer object is much the same as using the FileSystem object or ADODB object, both of which have been covered in recent months. Each object has a specific function: to manipulate text files, database tables or, in this case, email messages. Similarly, each has a set of inbuilt commands so you can specify any relevant variables. In the FileSystem object, you might specify the name of a text file you wish to read from. With the ADODB object, you must specify a database name and driver to use. Likewise, with the mailer object, you specify details such as which mail server to use and which email address to send mail to.

Create the mail form

The first page you need to create, which we'll call mailform.asp, is a very straightforward HTML form page. It needs two input fields and a submit button to do its

job. The two fields are a text input for the email's subject and a text area for the body of the message. The action for this page is sendmail.asp, which is where all the work is done. The only other requirement for this page is a password protection script to protect your administration area. We covered this in September Insite, and re-used it last month (see APC September, page 151, and October, page 166). The code for this page is on this month's cover CD, and the resulting Web page is shown in figure 1. For convenience, you may want to link to this page from main.asp in your administration area. Otherwise you'll need to type the complete URL into the browser and bookmark it.

Process the mail form

The only other page you need is sendmail.asp. This page performs a number of functions that work together to send a single email to everyone on your mailing list. First, it pulls all of the subscriber email addresses out of your data-

base. Then it creates an instance of your email object and sets it up ready to connect to a mail server. Lastly, it sends the message you submitted from mailform.asp to the addresses in your database, and disposes of your mailer and database objects.

To begin with, use a slightly modified version of last month's code to create a database connection object and run a simple query selecting all database records with

These parameters are static and will be the same for every email you send using this page. The dynamic parameters, which will change every time you send a new email, are the subject and body of the message, and the recipients' email addresses. The subject and message parameters are set using the subject and body-Text methods of the mailer object. Equate them to the submitted form fields by using the request.item("fieldname") method as we did to modify database records last month. To dynamically add recipients, use the addBCC method inside a loop that cycles through the results of the SQL select statement run earlier in the page. Use the addBCC method instead of the addRecipient or addCC methods, so as to suppress the names and email addresses on the mailing list. The code for this is shown in listing 3. If you are working on a desktop PC that isn't connected to or running a mail server, you can set the live property of the mailer object to 'false'. This will allow you to write and test your page in the absence of a mail server. It won't send email, but it will behave as if it does.

Set optional mail parameters

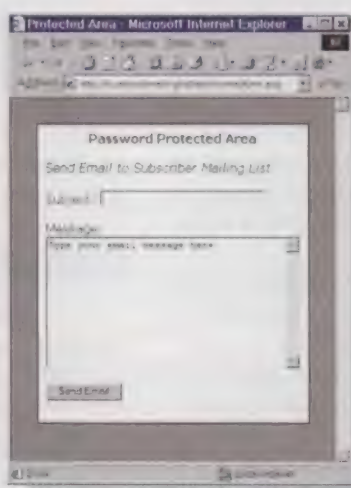
By default, any mail you send using the SA-SMTPmail object is sent as plain text. If you plan on sending HTML-formatted email, you will need to set the Content-Type property to 'text/html'. Remember that not all mail clients support HTML-formatted email, so you may want to provide your subscribers with the option to receive email as HTML or in plain text. How this is done is discussed below.

If you are sending plain text email, you may want to set the wordWrap property and the number of characters to wrap around in the wordWrapLen property.

Send the email

To send the email, you need to call the method sendmail. This method returns a value of true or false, which can be tested using an If...Then...Else statement to determine whether the email was successfully sent. The response property can then be printed to the page to display any error messages generated by the mailer object or the mail server while trying to send the email.

If you experience trouble getting the mailer object to work, try setting the timeout and SMTPlog properties to assist the debug-



▲ Figure 1: The password-protected mailform.asp page

a status of 1. This is shown in listing 1. Next, create an instance of the SA-SMTPmail object using the now familiar Server.CreateObject function. Once this is done, set a few parameters for the mailer so that it can successfully connect to a mail server and send mail. Just like any other mail client, such as Outlook Express, your mailer needs to know the name of the mail server as well as the email address and name of the sender. Set these parameters using methods that are built into the SA-SMTPmail object — FromName, FromAddress, remotehost, and replyto — as shown in listing 2.

ging process. The first of these will disconnect the mailer object from a slow or malfunctioning mail server after a specified number of seconds, and the second will log all mailer activity to a text file on your server. Remember, the Web server needs to be connected to a mail server on the Internet to send any email, and if you set the live property to 'false' at any stage, you'll need to reset it to 'true', so that mail can be sent.

Further suggestions

You can quite easily personalise your emails by looping over the recordset and sending a single email for each address, rather than one email with multiple recipients. To insert the subscriber's name in an email, you could use a string such as '@name@' in your message and then, by calling the ASP replace function in `sendmail.asp`, you can replace that string with the value of `rsTemp("name")` before sending the email.

Those interested in more sophisticated email applications should read the SA-SMTPmail documentation. It's possible, for example, to encrypt your messages with PGP, which is perfect for sending information such as credit card details over the Net. There's also the option to include file attachments in your messages. You could use this feature to provide an alternative to HTTP downloads by creating a form that sends an email with file attachments upon request.

As noted previously, you can give your subscribers the option to receive their email in HTML or plain text. This involves adding a new numeric field to your database called 'html'. You then need to add a couple of radio buttons to your subscription page and update your database insert statement to reflect the change. Next, modify your mailform.asp page to submit two messages to `sendmail.asp`: one formatted in HTML and the other unformatted. Finally, in `sendmail.asp`, you send two emails by creating another instance of SA-SMTPmail, and test the value of `rsTemp("html")` before adding the user to either of the recipient lists.

There are many other applications for sending email from your site. For example, you can build a form that provides visitors with a quick way to send messages to you. This can be good for people browsing your site from computers without mail clients set up on them — like in Internet cafes.

For a list of sites that provide free ASP Web hosting and many other ASP resources, check ASPfree.com.

Next month, Insite looks at DHTML menus for enhancing your site's navigation.

Daniel Potts

Insite source code

Listing 1: Retrieving email addresses from the database

```
<%
set conn = createobject("adodb.connection")

DSN="DRIVER={Microsoft Access Driver (*.mdb)}; *
DSN=DSN & "DBQ=C:\inetpub\database\mailingList.mdb"
conn.Open DSN

SQL="select * from mailingList where status=1"
```

```
set rstemp=conn.execute(SQL)
%>
```

Listing 2: Setting up the mailer object

```
<%
Set Mailer = _Server.CreateObject("SoftArtisans.SMTPMail")

'Set the FromName and FromAddress

Mailer.FromName = "Mailing List Site"
Mailer.FromAddress = "you@yourSite.com" 'use YOUR mail server and email address here

mailer.remotehost = "mail.yourMailServer.com.au"
mailer.replyto = "you@yourSite.com"
%>
```

Listing 3: Setting dynamic email attributes

```
<%
'Subject and message from the submitted form

mailer.subject = request.item("subject")
mailer.bodytext = request.item("message") & vbCRLF

'add recipients as Blind Carbon Copies

do until rstemp.eof
    mailer.addbcc rstemp("name"), rstemp("email")
    Response.Write("Adding " & rstemp("email")) & "<br>"
    rstemp.movenext
loop

mailer.live = true

'Send the message

if Mailer.SendMail then
    Response.Write "<p>Mail sent..."
else
    Response.Write "<p>Mail failure. "
    Response.Write "Check server name and connection"
end if

response.write "<br>" & mailer.response
%>
```



For the complete code for all the pages used here, as well as the sample mailing list database, check this month's cover CD.



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For a complete archive of APC Insite columns, see apcmag.com.

We look more closely at streams to clarify some of their functions.

Streams and files

So far, Practical C++ has only touched on streams. This month, we'll look more closely at them to clarify some of their functions.

Being persistent

When we discuss *persistent* storage, we mean storage where data will not be lost when the computer is turned off. Usually, this will mean a hard disk, floppy disk, CD-ROM, DVD or similar device. This contrasts with *volatile* storage, which is lost when the computer is turned off.

When we save data to a persistent storage device, we usually organise it into files. Computer programs are stored in source files and are compiled to produce executable files. One of the ways to access files from a C++ program is to use *file streams*. An *input file stream* (ifstream) allows you to read data from a file and is similar in many ways to the input stream cin. An *output file stream* (ofstream) allows you to write data to a file, and its behaviour is similar to the output stream cout. A generic *file stream* (fstream) allows reading and/or writing.

Listing 1 demonstrates the basic usage of an output file stream. In the function save1(), the object 'of' of class ofstream is instantiated. Here, examples of four of the most common operations on an ofstream are shown. First, you open the file. In this instance, it's called "Hello1.dat". Next you test the 'state' of the ofstream, using the is_open() method, to ensure that the open operation succeeded. You write to the file using the insert (<<) operator and again check the state, this time using the fail() method. Finally, you close the ofstream. Checking the state after an operation is good programming style, and is critical for writing robust programs. There are many reasons why I/O operations might fail. You might use an incorrect file name, the disk could be full or you might not have permission to perform the operation. After any I/O operation where failure is significant, it is important to check whether the operation succeeded. Iostreams generally support the state methods in figure 1.

The function save2() performs exactly the same task as save1(), but using a different file name. It also uses a slightly different style. The save2() function provides the file name in the constructor for the ofstream,

Method	Description
good():	No errors have occurred.
bad():	The stream is experiencing errors.
eof():	The last extract (read) operation failed as you have reached the end of the file.
fail():	The last operation failed.
is_open():	The stream is open (file streams only).

▲ Figure 1: Iostream state methods

which causes the ofstream to open the file automatically. It does not close the file, as the ofstream's destructor automatically closes it. The file streams overload the "!" operator, so that "!of" is equivalent to "of.fail()".

One limitation of the ostream.cpp program is that each time the stream is opened, the file is erased and any data is lost. Sometimes you want to add data to a file without losing the existing data. To do this you have to specify the *openmode* for the stream. This can be done at the open command, or in the constructor, by specifying a second parameter, for example ofstream("Hello.dat", mode);.

Mode, in the line above, could be replaced by any one of the alternatives in the box below. So if we change the open() command in save1() to of.open("Hello1.dat", ios::append); it will append to the file each time it is run.

Listing 2 demonstrates a number of interesting features of Iostreams. Begin by declaring a user-defined type strlist_t as a vector of strings, using the typedef command. The readv() function (read vector)

openmode	Description
ios::app	Append (only allow writing at the end of the file)
ios::ate	At End (by default, write at the end of the file, but permit the application to specify writing at other parts of the file)
ios::binary	Read/write binary data instead of text
ios::in	Permit reading from a stream (extraction)
ios::out	Permit writing to a stream (insertion)
ios::trunc	Erase all data from the file when it is opened (truncate)

▲ Figure 2: Open modes for output file streams

reads a line at a time from an ifstream, using the STL getline() function, storing each line in the slist vector.

The writev() function (write vector) takes two parameters. The second is the vector to write. The first parameter is an ostream. This stream is used for output. It could be a console-based ostream such as cout, or it could be an ofstream which connects to a file. The writev() function doesn't know, or care, what type of stream is supplied. It simply pumps data down the stream and trusts the stream to know what to do with the data. This is a great aid in making re-usable code.

The writev() function uses a const_iterator (described in APC July 2000, page 148) to iterate along the vector (that is, visit each element in turn) and output each string in the vector.

Stringing you along

A stringstream connects to a string, instead of to a file. Its behaviour is similar to an fstream. You can write to the stringstream, using the insert operator, or read from it using the extract operator. The stringstream can be specialised as an istreamstringstream or an ostreamstringstream.

Listing 3 shows a program that builds a filename using today's date, and writes some log information into it. It uses an ostreamstringstream to build the filename. The time function it uses to obtain the date is described in 'Using C time functions' (included on this month's cover CD).

Next month, we'll look at exceptions. These are among the weirdest features of C++, but very useful. This is probably appropriate for December, when everyone goes a little crazy. Until then, keep on coding.

Michael Smith



For a complete archive of APC C++ columns, see apcmag.com.



Michael Smith can be contacted at emmenjay@zip.com.au.

C++ source code

Listing 1: ostream.cpp

```
#include <iostream>
#include <fstream>

using namespace std;

void save1()
{
    ofstream of;
    of.open( "Hello1.dat" );
    if (!of.is_open()) {
        cout<<"open failed"
            <<endl;
        return;
    }
    of<<"Hello World!"<<endl;
    if (of.fail())
        cout<<"write failed"
            <<endl;
    of.close();
}

void save2()
{
    ofstream of("Hello2.dat");
    if (!of) {
        cout<<"open failed"
            <<endl;
        return;
    }
    of<<"Hello World!"<<endl;
    if (!of)
        cout<<"write failed"
            <<endl;
}

int main()
{
    save1();
    save2();
    return 0;
}
```

Listing 2: fprint.cpp

```
#include <iostream>
#include <fstream>
#include <string>
#include <vector>
using namespace std;
typedef
    vector<string>strlist_t;

void readv( strlist_t &slist )
{
    slist.clear();
    ifstream in("input.dat");
    string s;

    if (in.fail()) {
        cout << "open failed"
            << endl;
        return;
    }
    getline(in,s);
    while (in.good()) {
        slist.push_back( s );
        getline(in,s);
    }
}

void writev(ofstream &os,
            strlist_t &slist)
{
    strlist_t::
        const_iterator i;
    for (i=slist.begin();
         i!=slist.end();
         i++) {
        os << *i << endl;
    }
}

int main()
{
    strlist_t slist;
    readv( slist );
    writev( cout, slist );

    ofstream os("Output.dat");
    if (os.is_open())
        writev( os, slist );

    return 0;
}
```

Listing 3: datestamp.cpp

```
#include <iostream>
#include <fstream>
#include <sstream>
#include <string>
#include <ctime>

using namespace std;

void getDate( int &day,
              int &month,
              int &year )
{
    time_t now = time(NULL);
    struct tm *pTm =
        localtime( &now );
    day = pTm->tm_mday;
    month = pTm->tm_mon;
    year = pTm->tm_year+1900;
}

string makeFileName()
{
    int day, month, year;
    getDate(day,month,year);

    ostringstream os;

    os << day
        << "."
        << month
        << "."
        << year
        << ".log";
    return os.str();
}

void writeLog( const string &s )
{
    string fname =
        makeFileName();
    ofstream of(
        fname.c_str(),
        ios::app );
    if (of.is_open())
        of << s << endl;
}

int main()
{
    writeLog( "Something" );
    return 0;
}
```



All these listings can be found on this month's cover CD.

*Input and output operations in
Java programming.*

I/O operations

Compared to C and C++, Java has little support for input and output (I/O) operations. This is not because the language's design is deficient, or has some flaw in its implementation, but because Java is based on a different model.

Perhaps because of their Unix origin, C and C++ assume that the computer system interface consists of a text-based console and a keyboard with characters in a Western European alphabet. However, Java makes no such assumption about input characters or devices and barely contains elementary support for a text-based console device and command-line interface. This is because Java is designed for the Internet age, for international users on a variety of quite dissimilar computing devices. This flexibility is valuable, but it can sometimes make things you'd normally take for granted very difficult.

There are two limitations often noted in Java input and output functions. These relate to the difficulty in obtaining alphanumeric data from the keyboard, and in formatting output to the console device. In previous columns, you've learnt how to write applets that have graphical user interfaces. Java provides extensive support for applets, but as already mentioned, only minimal support for text-based consoles. However, sometimes you'll need simple input and output — particularly if you want to replace legacy command-line C and C++ applications with Java, or read and write to simple text files.

Java character data

Java I/O often relates to text, and text consists of characters. Since data is stored in computer memory as binary values, characters are represented by a conventional numeric encoding. In ASCII encoding, the letter A is mapped to the number 65, B to the number 66, the space to the number 32, and the digit 1 to the number 49.

Code must keep track of whether a stored value represents a binary number, a portion of a binary number, or an alphanumeric character. Some I/O devices are designed to assume that data always represents some specific character encoding. For example, when you send the value 66 to the console device, it knows to look up a bitmap for the letter B and display it on the screen.

For many years, computer technology assumed that character data was needed

only for the 10 decimal digits, the upper and lower-case letters of the English alphabet, and a few dozen additional symbols such as punctuation marks. Some systems later added a few other characters that were necessary in Western European languages and in mathematical expressions. However, these character sets do not include characters in other languages.

Java was conceived as a universal language. It supports dozens of character sets, including ASCII, ISO Latin-1 and Unicode.

The simplest and most limited Java character set is defined within the American Standard Code for Information Interchange (ASCII). This set contains 128 characters in the range 0 to 127.

A second character set supported by Java is defined by the International Standards Institute Latin-1 standard (ISO Latin-1). This character set consists of a byte value in the range 0 to 255. The first 128 values are the same as those in the ASCII set. The remaining ones, in the range 128 to 255, are the characters needed to represent several languages, including French, Spanish, Italian, and German (in Roman script), typesetting symbols, some Greek letters often used in mathematics, mathematical symbols, copyright and trademark glyphs and common fractions.

The most comprehensive character set supported by Java is Unicode. Unicode characters are encoded in 16 bits, which allows values in the range 0 to 65,535. This is the same range as the Java `char` primitive data type. Unicode allows for the representation of the characters of most modern languages, including Cyrillic, Greek, Arabic, Hebrew, Persian, Chinese and Japanese. The first 256 characters of the Unicode character set coincide with the ISO Latin-1 set.

The fact that Unicode characters are encoded in two bytes can create problems when using stream-based read and write operations. Streams have traditionally assumed that alphanumeric data consists of single bytes. To read Unicode characters from the stream, a traditional C or C++ program reads a first byte, shifts all the bits eight positions to the left, reads the second byte, then ANDs the lower eight bits of the second byte to the shifted bits of the first one. The same results are

obtained by multiplying the first byte by 256 and adding the second. One risk of reading 16-bit data eight bits at a time, is that program code might lose step and combine the second byte of one character with the first byte of the next one.

Although Java has rudimentary support for text-based I/O, its readers and writers are designed for handling any of the supported character sets. If the host system is set for ASCII or ISO Latin-1, readers and writers operate one byte at a time. If the system is set for Unicode, then data is read from the stream two bytes at a time.

The java.io package

I/O operations are the subject of the `java.io` library. Java I/O is divided into two general types: byte based and character based I/O. One is handled by Java input and output stream,; the other by readers and writers.

In either case, the general approach is to make an abstraction of the data source and of the destination. This makes it possible, using the same methods, to read and write from a file, a text-based console or a network connection. In other words, Java code need not be concerned with where the data is coming from or where it is going. Once the I/O stream has been defined, it is possible to automatically receive, send, format, filter, compress and encrypt the data.

Streams

The fundamental element of Java I/O is the stream. The metaphor of a stream of water is used to represent the flow of data, which is defined as an ordered sequence of bytes of undetermined length. An input data stream moves bytes *from* an external source and an output data stream moves bytes *to* an external destination.

Abstract classes and subclasses in java.io

InputStream	OutputStream
ByteArrayInputStream	ByteArrayOutputStream
FileInputStream	FileOutputStream
FilterInputStream	FilterOutputStream
InputStream	OutputStream
ObjectInputStream	ObjectOutputStream
PipedInputStream	PipedOutputStream
SequenceInputStream	
StringBufferInputStream	

Java source code

Listing 1: A class to manage basic console input

```
public class basicinput {
    public static void main (String args[]) {
        String s = inString ("Give me a string: ");
        System.out.println ("You typed " + s);

        int i = inInt ("Now an int: ");
        System.out.println ("You typed " + i);

        char c = inChar ("Now a char: ");
        System.out.println ("You typed " + c);
    }

    public static void inputFlush () {
        int dummy;
        int bAvail;

        try {
            while((System.in.available()) != 0)
                dummy = System.in.read();
        }
        catch(java.io.IOException e) {
            System.out.println("Input error");
        }
    }

    public static void printPrompt (String prompt) {
        System.out.print (prompt);
    }

    public static char inChar (String prompt) {
        int aChar = 0;

        inputFlush ();
        printPrompt (prompt);

        try {
            aChar = System.in.read();
        }
        catch(java.io.IOException e) {
            System.out.println("Input error");
        }

        inputFlush();
        return (char) aChar;
    }


    public static String inString (String prompt) {
        int aChar;
        String s = "";
        boolean finished = false;

        printPrompt (prompt);

        while(!finished) {
            try {
                aChar = System.in.read();
                if (aChar <\> 0 || (char)aChar == '\n')
                    finished = true;
                else if ((char)aChar != '\r')
                    s = s + (char) aChar;
            }
            catch(java.io.IOException e) {
                System.out.println("Input error");
                finished = true;
            }
        }
        return s;
    }

    public static int inInt (String prompt) {
        return Integer.valueOf (inString(prompt).trim()).intValue();
    }

    public static double inDouble (String prompt) {
        return Double.valueOf (inString(prompt).trim()).doubleValue();
    }
}
```

 This listing can be found on this month's cover CD.

The java.io package contains two stream-based abstract classes named `InputStream` and `OutputStream`. The subclasses are listed opposite.

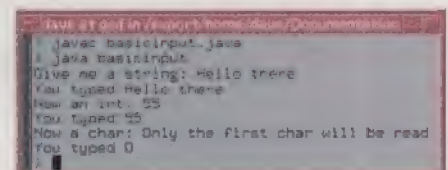
One of the difficulties of Java stream operations is that the byte data type is not convenient. Many of the methods in the stream classes are documented to accept or return byte arguments, but in reality they operate on int data. The main reason is that there are no byte literals in Java, but the compiler sometimes makes automatic assignment conversions, as follows.

```
byte val1 = 22;
byte val2 = 44;
```

Both of the preceding values above are valid assignments, but the following are illegal.

```
byte val3 = val1 + val2;
byte val4 = 1 = 3;
```

The small range of the byte data type explains why they are often converted to int in calculations. The calculated values are later typecast back into the byte format. This means that a stream is defined to operate on byte data, but internal processing of numeric data by string-based classes is often done on int data types.



▲ A sample run of this month's Java class that manages basic console input

Standard streams

Applications often use the keyboard as the input stream and the display system as an output stream. In this case, it is said that the keyboard is the standard device for console input, and that the video display

The most important methods in the InputStream class

Methods	Description
inString()	allows the promptless input of a string. This method is used internally by the class to obtain the individual characters in an int or double variable.
InputFlush()	makes sure that there is no data available in the input stream. If data is found, the read() method is called to remove it. InputFlush() is called by the data input methods in the Keyin class.
inString(String prompt)	is used to input a user string. The string passed as an argument is displayed as a prompt.
inInt(String prompt)	allows the input of an int type value. The string passed as an argument is displayed as a prompt.
inChar(String prompt)	allows the user to input a single value of type char. The string passed as an argument is displayed as a prompt.
inDouble(String prompt)	allows the user to input a floating point value and returns it as a value of type double. The string passed as an argument is displayed as a user prompt.

is the standard device for console output. In addition, an error stream is provided for directing error messages during debugging. The System class in the java.lang package contains three fields that relate to the standard streams that follow.

```
public static final InputStream in;
public static final PrintStream out;
public static final PrintStream err;
```

PrintStream extends FileOutputStream, which then extends Output-

Stream. PrintStream adds functionality by allowing the display of various data types. In addition, PrintStream contains the println() method, which you will have often used in programs in this column. This method adds a newline character (\n) at the end of the string or array, and automatically flushes the stream.

The standard streams are always open and ready for use. This makes them convenient for Java console applications.

A sample program

Using the six methods listed in the table on this page, a class that provides basic input for character and numeric types can be written (see listing 1).

Next month, the Java column looks at InputStreams and OutputStreams to find out how they work and what they do. In the meantime, see if you can put your class to work in a program of your own. Ask someone to enter their name and then some numbers. Display the results to test whether you have been able to read them correctly.

David Williams



For a complete archive of APC Java columns, see apcmag.com.



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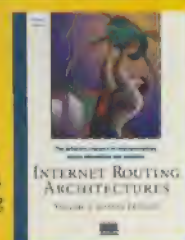
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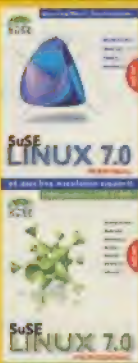
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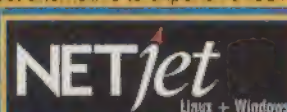
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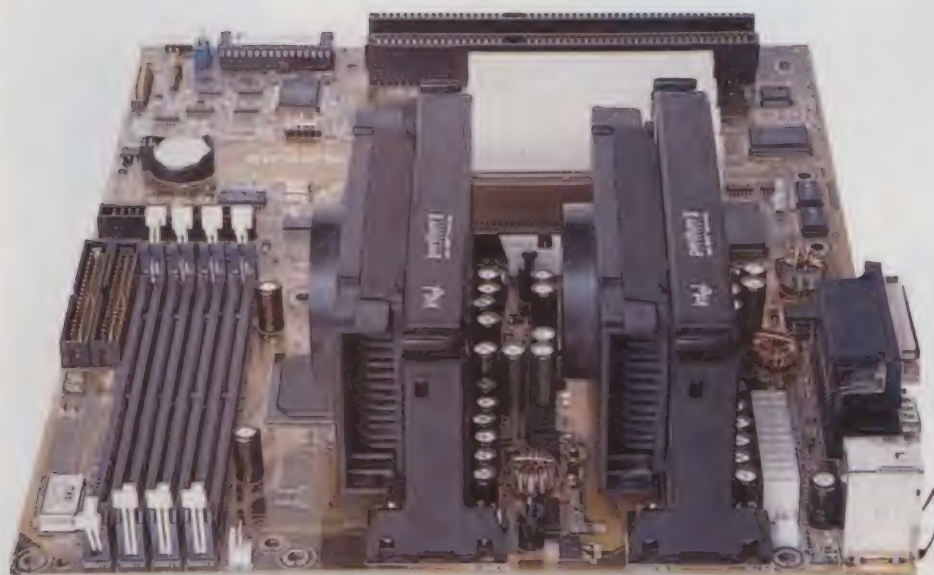


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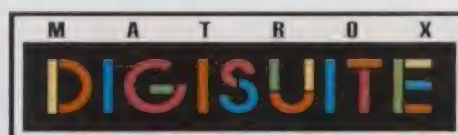
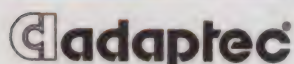
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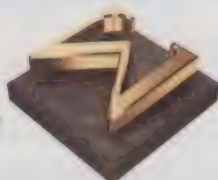
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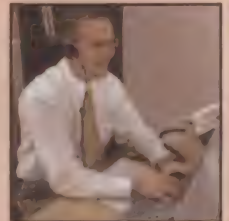
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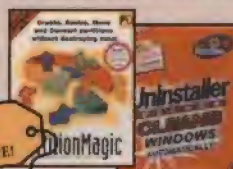
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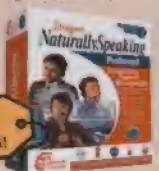
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CE-51BK	SO20025	STYLUS 800/1000 Black	\$21.00
CE-52BK	SO20034	STYLUS Colour/Colour Pro Black	\$26.00
CE-53CL	SO20028	STYLUS Colour/Colour Pro 3-Colour	\$39.00
CE-54BK	SO20047	STYLUS 200/820/Colour II /iis Black	\$17.00
CE-55CL	SO20049	STYLUS 200/820/Colour II /iis 3-Colour	\$27.00
CE-56PBK	SO20093	STYLUS Colour 400/500/600/Photo Black	\$22.00
CE-57CL	SO20097	STYLUS Colour 200/300 3-Colour	\$30.00
CE-58BK	SO20108	STYLUS Colour 900/850/1520 Black	\$22.00
CE-59CL	SO20089	STYLUS Colour 400/600/800/1520 3-Colour	\$30.00
CE-60PCL	SO20110	STYLUS Colour 700/Photo/Photo 700 5-Colour	\$34.00
CE-61BKCL	SO20138	STYLUS Colour 300 4-Colour	\$40.00
CE-65BK	SO20187	STYLUS Colour 440/640/660 Black	\$21.00
CE-66BK	SO20189	STYLUS Colour 740/760 Black	\$21.00
CE-67CL	SO20191	STYLUS Colour 440/640/660/740/760 3-Colour	\$34.00
CE-68PCL	SO20193	STYLUS Photo 750 5-Colour	\$43.00
CE-69CL	TO02011	STYLUS Colour 900 Black	\$19.00
CE-70CL	TO05011	STYLUS Colour 900 Colour	\$24.00
CE-71PCL	TO01011	STYLUS Photo 1200 5-Colour	\$29.00
CE-72BK	TO07	STYLUS Colour 870/1270 Black	\$24.00
CE-73CL	TO08	STYLUS Colour 870 Colour	\$29.00
CE-74CL	TO09	STYLUS Colour 1270 Colour	\$34.00

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A3HRP	A3 90gsm Hi-Res Paper	100	\$ 30.00	0.30
A4WF	A4 White Film 100mu	50	\$ 47.00	0.94
A3WF	A3 White Film 100mu	50	\$ 90.00	1.80
A4CF	A4 Clear Film 100mu	50	\$ 39.00	0.78
A3CF	A3 Clear Film 100mu	50	\$ 71.00	1.42
A4FGP	A4 Full Gloss Photo Paper	50	\$ 44.00	0.88
A3FGP	A3 Full Gloss Photo Paper	50	\$ 79.00	1.58
A4PH	A4 Economy Photo Paper	50	\$ 23.00	0.46
AC2	Artists Canvas	25	\$ 80.00	2.40
GC4F	Greeting Card (4 Fold)	100	\$ 28.00	0.28
GC8F	Greeting Card (8 Fold)	100	\$ 48.00	0.48
DCCS	Double Coated Card Stock	50	\$ 24.00	0.48
GCS	Glossy Card Stock	50	\$ 24.00	0.48
TTP	T-Shirt Transfer Paper	15	\$ 15.00	1.00
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CANON BJC-70/BJC 80	60	21-BKL
CANON BC-01/02/BJ-10E/20/200/BJC-210/240/255/265/1000	6	3-BKL
CANON BJ-300/330	7	4-BKL
CANON BJC-600/610/620	16	5-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	45	19-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20	9	18-BKL
CANON BJC-3000/6000/6500/8000	6	46-BKL
CANON BJC-7000 Series	6	43-BKL
HP Desk Jet 400/500 Series	6	8A-BKL
HP Desk Jet 600/660/690 Series	6	8B-BKL
HP Desk Jet 700/800/900/1000/ Series	6	29-BKL
HP Deskjet 300 Series & Olivetti JP's!	8	7-BKL
EPSON Stylus 400/800/800+/1000	8	1-BKL
EPSON Stylus Colour /PRO/XL	8	2-BKL
EPSON Stylus 820/colour II/Is	12	23-BKL
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	12	33A-BKL
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	12	33B-BKL
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	6	35A-BKL
IBM/LEXMARK 5000/5700/7000 & Z Series	6	35B-BKL
BROTHER 7160/9100C	8	49-BKL
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CANON BJC-210/210SP/240/255/265/1000	3x12	25-CLR
CANON BJC-600/610/620	3x8	10-CLR
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	3x30	17-CLR
CANON BJC-3000/6000/8000 Series	3x6	47-CLR
CANON BJC-7000 Series	3x6	44-CLR
HP Colour Desk Jet 300/400/500 Series & Olivetti	3x12	14A-CLR
HP Colour Desk Jet 600C/660C/690C Series	3x12	14B-CLR
HP Desk Jet 850C/855C/870C/1000C Series	3x3	30A-CLR
HP Desk Jet 710/720/890/900 Series	3x3	30B-CLR
EPSON Stylus Colour /PRO/XL	3x4	16-CLR
EPSON Stylus 820/colour II/Is	3x12	24-CLR
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	3x12	34A-CLR
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	3x12	34B-CLR
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	3x6	36A-CLR
IBM/LEXMARK 5000/5700/7000 & Z Series	3x6	36B-CLR
BROTHER 7160/9100C	3x6	50-CLR
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AMD Athlon K7-850T 3D (oem) (Socket A)	\$533
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AMD Athlon K7-950T 3D (oem) (Socket A)	\$790
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ACOpen A64 Pro (VIA, Slot-1, Audio, 133)	\$207

Imomma 250M Zip Int. IDE (oem) bare drive	\$200
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Altec Lansing ACS33 - 3p	\$84
Altec Lansing ACS45 1 Power Cube - 3p	\$170
Altec Lansing ALP2 Flatpanel - 3p (multi-channel)	\$229
Altec Lansing ACS56 Gamers - 5p Digital in	\$263

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HP Scanjet 5300C USB	\$470
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Microtek X12 (1200x2400) Dual USB/SCSI	\$584
Microtek ArtixScan 4000T	\$2,464

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Netcom InModem 56K V90 Int. PCI (oem)	\$71
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3Com USR Sportster 56K Ext	\$202
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Hauppauge WinTV Radio PCI	\$307
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Kodak DVC-325 Digital Video Camera USB	\$203
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Logitech QuickCam Pro USB	\$198
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Viewmaster M175L 17", .27 MPRII OSD	\$355
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Logitech WingMan Formula Force	\$285
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Canon BJC-2100SP 5ppm	\$160
Canon BJC-3000SP	\$239
Canon BJC-6200 8ppm (1440x720)	\$419
Canon BJC-6500 8ppm (1440x720) (A3)	\$594
Canon BJC-8200	\$595
Canon LBP800W 8ppm	\$499
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Epson Stylus Color 1180 (A3+)	\$781
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- Microsoft Intellimouse PS/2
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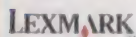
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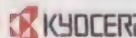
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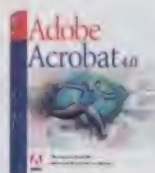
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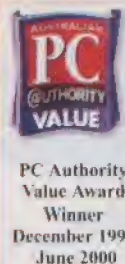
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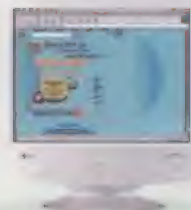
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Celeron 633	\$240
Pentium III 733EB	\$420
Pentium III 800E	\$550
Pentium III 850E	\$740
Pentium III 866E	\$764
Pentium III 933E	\$1070

AMD

Athlon 600	\$245
Athlon 700	\$330
Athlon 750	\$370
Athlon 800	\$410
Athlon 850	\$530
Athlon 900	\$610
Athlon 950	\$780
Duron 600	\$160
Duron 650	\$190
Duron 700	\$240
CPU Fan	\$30

Memory

64MSDRAM	\$130
128MSDRAM	\$260

Hard drive

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U10 20GB	\$210
7200 RPM	
Barracuda 15GB	\$220
Barracuda 20GB	\$270
Barracuda 30GB	\$340

Western Digital

Caviar 15GB	\$225
Caviar 20GB	\$270



Deskstar 20Gb	\$300
Deskstar 30Gb	\$350

Motherboard

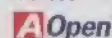
Pentium II / III	
ASUS P3V-4X	\$220
ASUS CUV-4X	\$230
ASUS CUSL2	\$320
ASUS P3C2000	\$325



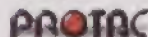
GA-6VXE7+	\$155
GA-6VXC7-4X	\$180
GA-6VX7-4X	\$190
GA-6BXC	\$170
GA-6BX7	\$190
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MSI-6309	\$170
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AX63 PRO	\$165
AX6BC	\$165
AX6BC PRO	\$190
AX64 PRO	\$200



M741 / M748	\$160
M754LMR	\$180
M758LMR	\$165

AMD Athlon

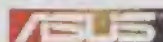
Gigabyte 71XE	\$220
Gigabyte 7ZX	\$270
MSI 6195	\$220
ASUS K7V-T	\$300
ASUS A7V	\$310

Pentium (socket 7)

Gigabyte 5AA	\$150
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32Mb TNT2 with TV out video in (AGP)	\$180
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Matrox G400 MAX 32Mb	\$445



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V7700 GeForce 32Mb Pure, DDR	\$635
V7700 GeForce 32Mb Deluxe, DDR	\$710
Creative GeForce 32Mb IIGTS	\$600
Gigabyte GeForce 256 AGP 32Mb	\$330
Power Colour Geforce II MX AGP 32Mb	\$280
Voodoo II PCI 12Mb PCI	\$140
Voodoo III 3000 AGP 16Mb TV out	\$240
Voodoo III 3000 AGP 16Mb	\$210
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BJC7100	\$450
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HP 810C	\$270
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640UT Vuego	\$260
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Canon N650U	\$200
Canon FB620S	\$240
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HP 4200C	\$240
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• Subwoofer Speakers	
• Midi ATX case	
• Acer Keyboard	
• Logitech Intelligent Mouse & Pad	
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Celeron 600	\$1630
Celeron 667	\$1720
Pentium III 733	\$1860
Pentium III 800	\$2020
Pentium III 866	\$2250

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• 3D Sound card	
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• Win98 Keyboard	
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Athlon 600	\$1350
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Athlon 800	\$1550
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Celeron 667	\$1199
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Pentium III 800	\$1500
Pentium III 866	\$1700

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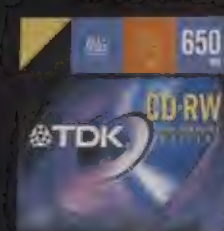
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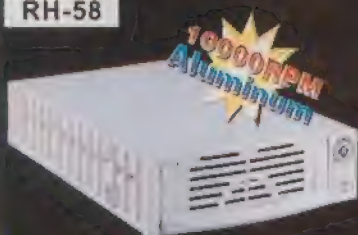
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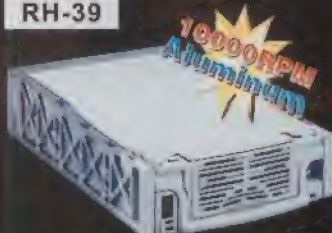
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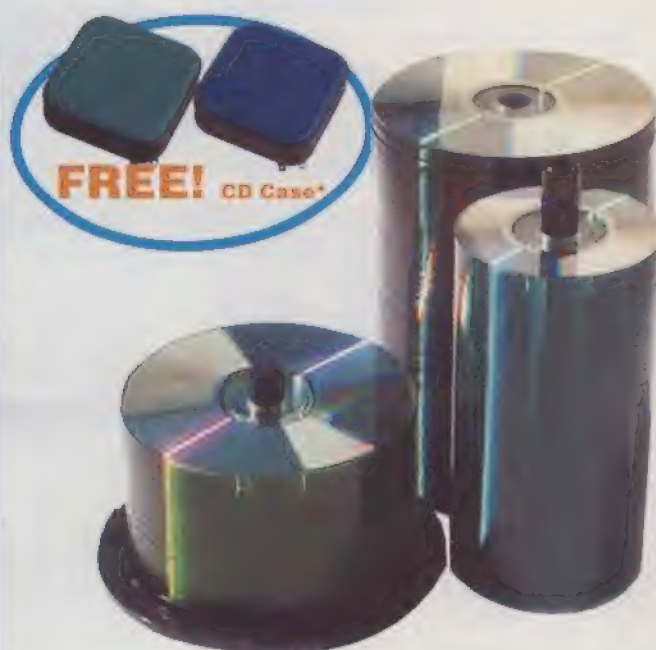
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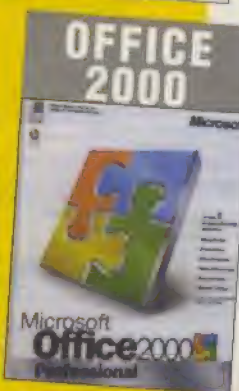
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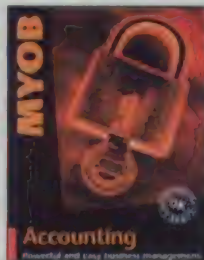
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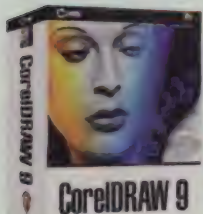
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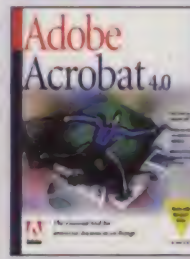
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 EPSON Stylus Colour /PRO/XL
 EPSON Stylus 820/colour II/Is
 EPSON Stylus Colour 200/300/400/500/600/800/850/1520
 EPSON Stylus Colour 440/460/640/660/700/740/760/900
 IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series
 IBM/LEXMARK 5000/5700/7000 & Z Series
 CANON, EPSON, HP Fluorescent & Photo Realistic Kits!

No. of Refills
 60
 9
 7
 16
 45
 9
 6
 6
 6
 8
 8
 12
 12
 12
 6
 6
 12

Kit Code
 21-BKL
 3-BKL
 4-BKL
 5-BKL
 19-BKL
 18-BKL
 46-BKL
 8A-BKL
 8B-BKL
 29-BKL
 7-BKL
 1-BKL
 2-BKL
 23-BKL
 33A-BKL
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 CANON BJC-210/210SP/240/255
 CANON BJC-600/610/620
 CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
 CANON BJC-3000/6000/6500
 HP Colour Desk Jet 300/400/500 Series & Olivetti!
 HP Colour Desk Jet 600C/660C/690C Series
 HP Desk Jet 850C/855C/870C/1000C Series
 HP Desk Jet 710/720/890 Series
 EPSON Stylus Colour /PRO/XL
 EPSON Stylus 820/colour II/Is
 EPSON Stylus Colour 200/300/400/500/600/800/850/1520
 EPSON Stylus Colour 440/460/640/660/700/740/760/900
 IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series
 IBM/LEXMARK 5000/5700/7000 & Z Series
 CANON, EPSON, HP Fluorescent & Photo Realistic Kits!
 New!! Epson Photo 750/1200 & Canon Photo 7100 Refill Kits!

No. of Refills
 3x30
 3x12
 3x8
 3x30
 3x4
 3x12
 3x12
 3x3
 3x3
 3x4
 3x12
 3x12
 3x12
 3x6
 3x6
 12/Colour

Kit Code
 22-CLR
 25-CLR
 10-CLR
 17-CLR
 47-CLR
 14A-CLR
 14B-CLR
 30A-CLR
 30B-CLR
 16-CLR
 24-CLR
 34A-CLR
 34B-CLR
 36A-CLR
 36B-CLR
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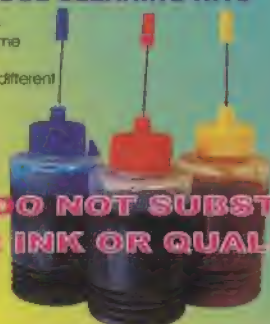
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Canon BJ-30, BJC-70, BJC-80
Canon BC-01, BC-02, BJC-210
Canon BC-03, BC-3X (fax) BJC-210sp, 245, 255, 265
Canon BC-06 photo
Canon BJ-300, 330
Canon BJC-600, 610, 620
Canon BJC-800, 820, 880
Canon BJC-2000 BC-20, BCI-21, BCI-21C
Canon BJC-4000, 4100, 4200, 4300, 4500, 4550, 5000, 5500 BCI-21
Canon BJC-4000, 4100, 4200, 4300, 4550, 5000, 5500 BC-20
Canon BJC-5000/5500 (BC-23 only)
Canon BJC-3000 / BJC-6000 (BC-30 & BC-31)
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Canon BJC 7000, 7100 BC-60, BC-61
Canon BJC 7000, 7100 photo BC-62
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K2BK	6/9	K10CLR	12
K3BK	6	K22CLR	6
K3BK	6	K11CLR	6
K1BK	6/9	K9CLR	12
		K25CLR	6
K7BK	60	K1CLR	30
K8BK	7	K2CLR	12
K4BK	9	K2CLR	12
		K23CLR	6
K9BK	7		
K10BK	16	K3CLR	8
K11BK	12	K4CLR	4
K12BK	9/60	K5CLR	30
K12BK	60	K5CLR	30
K12BK	9	K5CLR	30
K27BK	9	K5CLR	30
K28BK	12	K35CLR	6
		K36CLR	6
K19BK	2	K24CLR	6
		K15CLR	6
K13BK	12	K20CLR	6/12
K16BK	12	K7CLR	6/12
K14BK	12	K6CLR	12
K15BK	5	K6CLR	6
K17BK	12	K20CLR	6/12
K17BK	12	K6CLR	6
K17BK	12	K17CLR	6/12
K21BK	3	K34CLR	3
K26BK	12	K16CLR	6/12
K6BK	12	K18CLR	6/12
K6BK	12	K35CLR	6
		K33CLR	6/12
K18BK	4	K15CLR	12
K24BK	6	K15CLR	12
		K29CLR	12
K25BK	6	K36CLR	12
K20BK	5	K18CLR	12

31120-8	Photo Glossy Paper 100 GSM - Makes any ink water resistant	A4	20	\$24.90
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25115-3	Transparency Film (100 UM)	A4	15	\$19.90
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14103-4	Design-A-Mag - FRIDGE MAGNET	A4	3	\$19.90
14210-9	CD Labels (Starter Kit) software and 2 samples of each label	6.25 x 11	10	\$36.00
13708-2	CD Labels (Fun Kit)	6.25 x 11	8	\$26.00
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13810-2	CD Labels (Galaxy Refill)	6.25 x 11	10	\$26.00
13910-9	CD Labels (Starburst Refill)	6.25 x 11	10	\$26.00
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Canon/Apple200 Series	BC-01/02	3	2788
Canon 210SP	BC03/0303	3	2788
Canon BJ-300/330	BJ-642	2	2888
Canon BJC-800 Series	BJC-201	6	2588
Canon/Apple BJC-4000/5500	BCI-210	15	0788
Canon/Apple BJC-4000/5500	BC-20	3	0488
Canon BJC-7000 & Optimiser	BC-80	2	5288
HP Deskjet 400/500 Series	5162SA/33M	2/3	1688
HP Deskjet 600 Series	5162SA	2	1488
HP Deskjet 800 Series/1600c	5164SA	2	1288
Epson Stylus 400/800/1000 (1st ref.)	SO20025	6	2388
Epson Stylus Colour/ProXL	SO20034/82	4/2	2288
Epson Stylus Colour 820/1111s	SO20047	4	2088
Epson Colour 400/500/600	SO20093	6	1888
Epson Colour 800/1520	SO20108	4	1888
IBM 4076 Lexmark 1000/1020/2070 Black		3	0588
Xerox 4004 C-TOUCH	CJ300	3	4988

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Canon BJC-800 Series	BJC-201	3x10	240X
Canon/Apple BJC-4000/5500 Series	BCI-210	3x30	060X
Canon BJC-7000	BCI-61	3x4	510X
HP Deskjet 400/500 Series	5162SA	3x10	150X
HP Deskjet 600 Series	5164SA	3x10	130X
HP Deskjet 800 Series/1600c	51641A	3x6	110X
Epson Stylus 200/500	SO20097	3x10	190X
Epson Stylus Colour/ProXL	SO20036/86	3x8/2	210X
Epson Stylus 820/1111s	SO20049	3x10	190X
Epson Stylus 400/500/600/700/Photo Ex	SO20089	3x10	170X
IBM 4076 Lexmark 1000/1020/2070 Colour		3x6	540X

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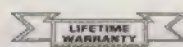
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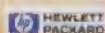
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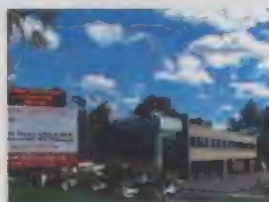
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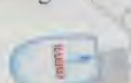
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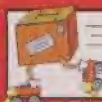
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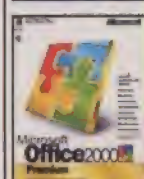
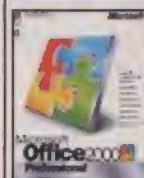
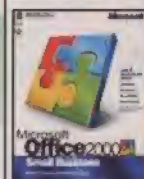
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The next generation of NT workstation for the desktop. Built on Windows NT® technology and an easy-to-use, familiar Windows® 98 user interface, Windows 2000 Professional makes business users more productive. Its integrated Web capabilities and broad support for mobile computers and hardware devices makes Windows 2000 the easy way for business users to connect to the Internet anywhere and anytime. And its rock-solid reliability and improved manageability simplify desktop management for IT Professionals.

**Windows® 2000 Professional
Version Upgrade from
Windows NT WorkStation**

(88594) GST INC. **\$242.00**

**Windows® 2000 Professional
Product Upgrade from
Windows 95/98**

(88593) GST INC. **\$356.40**

**Windows® 2000 Professional
Full Version**

(88592) GST INC. **\$509.30**

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Toshiba Install Options

For a small extra charge we can install your chosen options into your new Toshiba eg: more memory. Call for more information.

Satellite 2250CDT

The Satellite series is the ideal notebook for small and medium business, corporate projects and consumers providing the most CPU/Dollar from a major vendor without compromising features. This Satellite features a Celeron 600MHz CPU, 64MB Ram, 6GB Hard Disk, Windows® 98SE, 12.1" Active Matrix TFT Screen, 56KB Modem in an all new case.



(A7017) GST INC

\$3,218.00^{##}

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TFT

#SpeedStep

Compare Satellite Models

	Satellite 2250CDT	Satellite 2750XDVD
Processor	Celeron 600MHz	Pentium III 600MHz
RAM Std/Max	64/192 MB	64/192 MB
Hard Disk	6GB	6GB
Screen	12.1" TFT	12.1" TFT
CD-ROM	24xCD-ROM	No
Mic & Spkr	Speakers	Speakers
Port replicator	No	No
Select bay	No	No
DVD capable	No	Inc 8xDVD
Weight	3.17 kg	3.17 kg
Warranty	1 Year	1 Year
56K v.90 modem	Yes	Yes
RENT*	\$31.56	\$35.28
GST INC	\$3,218.00^{##}	\$3,598.00^{##}
With Windows 98SE	(A7017)	(A7018)

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Rent Smart

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21

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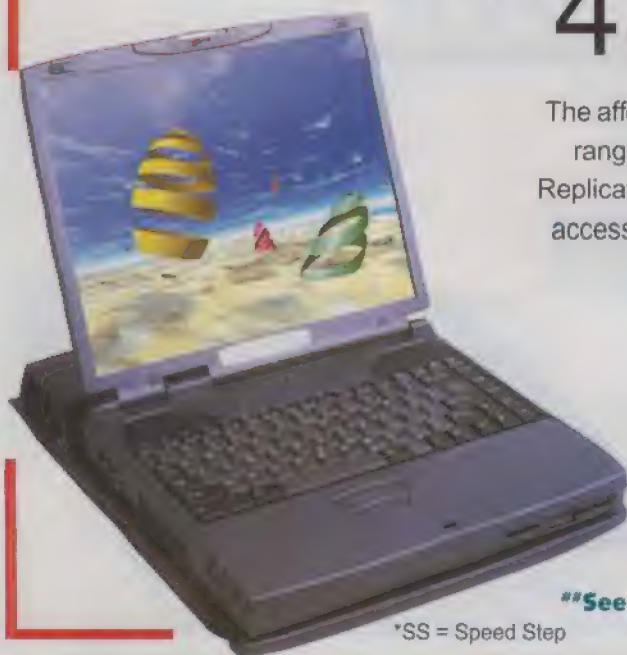
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Perfect Solution for Business Professionals

Satellite Pro 4310XCDT



The affordable high performance mobile computer. With a range of expansion capabilities, including optional Port Replicator for easy connection to desktop peripherals and accessories, Satellite Pro is the perfect, no-compromise solution for business professionals.



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(A2854) GST INC

\$3,774.00

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*SS = Speed Step

Compare Satellite Pro Models

	Satellite Pro 4310XCDT	Satellite Pro 4320DVD	Satellite Pro 4320XDVD	Satellite Pro 4360XDVD	Satellite Pro 4380XDVD
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 600MHzSS*	Pentium III 700MHzSS*	Pentium III 750MHzSS*
RAM Std/Max	64/320 MB	64/320 MB	64/320 MB	64/320 MB	64/320 MB
Hard Disk	6GB	10GB	12GB	12GB	12GB
Screen	13.3" TFT	13.3" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24xCD-ROM	DVD	No	No	No
Mic & Spkr	Yes	Yes	Yes	Yes	Yes
Port replicator	Optional	Optional	Optional	Optional	Optional
Video Ram	8Mb	8Mb	8Mb	8Mb	8Mb
DVD capable	No	Inc 6xDVD	Inc 6xDVD	Inc 6xDVD	Inc 6xDVD
Weight	3.17 kg	3.17 kg	3.17 kg	3.17 kg	3.17 kg
Warranty	1 Year	1 Year	1 Year	1 Year	1 Year
56K V.90 modem	Yes	Yes	Yes	Yes	Yes
RENT*	\$37.25	\$Call	\$44.84	\$47.39	\$52.27
GST INC With Windows 95/98	\$3,774.00 (A2854)	\$Call (xxxxx)	\$4,798.00 (94178)	\$5,199.00 (A2995)	\$5,735.00 (A2856)
RENT*	\$37.27	\$Call	\$45.48	\$48.29	\$53.96
GST INC With Windows 2000/NT4	\$3,928.00 (A2855)	\$Call (xxxxx)	\$4,990.00 (94179)	\$5,298.00 (A2996)	\$5,920.00 (A2857)



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Tecra 8100

DVD

- Intel Celeron 600MHz
- 14.1" TFT
- 64MB RAM
- 6GB HDD
- 6 x DVD
- 3 Year Warranty

Styled for consistent mobile performance, the Tecra 8100 series provides you with the ultimate combination of traditional Tecra investment benefits, high processor performance and a new sleek look and feel.

(A2860) GST INC

\$5,199.00

*SS = Speed Step



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Pentium® III
available in
some Tecra's

Compare Tecra 8100 Models

** See our Web Direct Link for the latest pricing - www.ht.com.au/cat/toshiba

	Tecra 8100	Tecra 8100	Tecra 8100	Tecra 8100
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 700MHzSS*	Pentium III 850MHzSS*
RAM Std/Max	64 MB	64 MB	128 MB	128 MB
Hard Disk	6GB	12GB	12GB	20GB
Screen	14.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24x CD-ROM	24x CD-ROM	24x CD-ROM	No
Mic & Spkr	Speakers	Speakers	Speakers	Speakers
Port replicator	Optional	Optional	Optional	Optional
Select bay	Yes	Yes	Yes	Yes
DVD capable	6 x DVD	6 x DVD	6 x DVD	6 x DVD
Weight	2.8 kg	2.8 kg	2.8 kg	2.8 kg
Warranty	3 Years	3 Years	3 Years	3 Years
56K V.90 modem	Yes	Yes	Yes	Yes
RENT* GST INC With Windows 95/98	\$47.39 \$5,199.00** (A2860)	\$58.05 \$6,369.00** (94185)	\$59.22 \$6,825.00** (A2868)	\$Call \$Call** (xxxxx)
RENT* GST INC With Windows 2000/NT4	\$49.20 \$5,398.00** (A2862)	\$59.23 \$6,498.00** (94186)	\$60.81 \$7,009.00** (A2869)	\$Call \$Call** (xxxxx)

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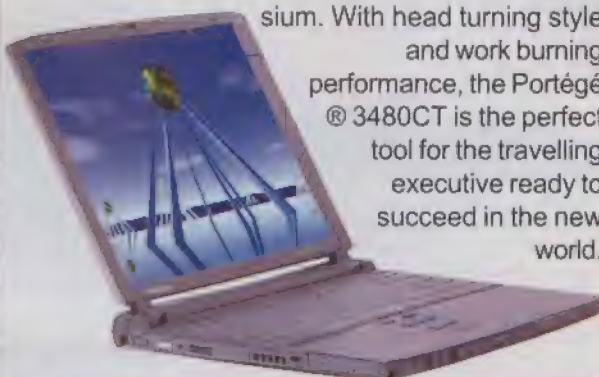
www.ht.com.au/cat/toshiba

Compare Ultra Portable Porteges

	Portégé 3480CT	Portégé 7220CTe
Processor	PIII 600MHz	PIII 650MHz
RAM Std/Max	64/192 MB	64/192 MB
Hard Disk	12GB	12GB
Screen	11.3" TFT	13.3" TFT
Display	1024x768	1024x768
CD-ROM	Optional	Optional
Mic & Spkr	Yes	Yes
Port replicator	Optional	Optional
Select bay	No	No
LAN	Yes	Optional
DVD capable	Yes	Yes
Weight	1.6 kg	2 kg
Warranty	3 Years	3 Years
56K V.90 modem	Yes	Yes
RENT*	\$45.44	\$60.15
GST INC	\$4,985.00	\$6,599.00 **
With Windows 95/98	(A5779)	(A7019)
RENT*		\$60.72
GST INC		\$6,718.00 **
Windows 2000/NT4	(N/A)	(A7020)

Portégé 3480CT

The Portégé® 3480CT is the ultimate statement in mobile computing with its Pentium® III power, large high resolution colour display, long battery life and easy functionality all packed into an ultra thin lightweight body finished in sleek magnesium. With head turning style and work burning performance, the Portégé® 3480CT is the perfect tool for the travelling executive ready to succeed in the new world.



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*SS = Speed Step

Toshiba Install Options

For a small extra charge we can install your chosen options into your new Toshiba: a modem, call for more information.

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IT & Business Solutions

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Options for Toshiba Notebooks

For more options
see Web Direct Link

TOSHIBA EDO Memory Upgrades

32MB for Tecra 8000 (not for PIII models)/ Portégé7000/Satellite 4000 (29356)	GST INC \$205.00
32MB for Portégé 3110 (81078)	GST INC \$189.00
64MB for Tecra 8000 (not for PIII models)/ Portege7000/Satellite4000 (29348)	GST INC \$245.00
64MB for Portégé 3020 (77229)	GST INC \$398.00

TOSHIBA Battery Packs

For Satellite 4000/4010/2520CDT & others (21930)	GST INC \$118.00
For Portégé 3010/3020 (Lithium Ion) (73665)	GST INC \$136.00
For Satellite 4000 Series (72109)	GST INC \$118.00
For Tecra 8000 (Lithium Ion) (29358)	GST INC \$258.00

TOSHIBA High Capacity Battery Packs

For Portégé 3010/3020 (72475)	GST INC \$258.00
For Portégé 7000/7020 (66479)	GST INC \$295.00

TOSHIBA Battery Charger

For Tecra 8000 (29357)	GST INC \$399.00
---------------------------	-------------------------

TOSHIBA Universal AC Adapter

For Tecra 8000/Satellite 4000/4010 & others (44200)	GST INC \$125.00
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TOSHIBA Additional 2 Year Warranty

For Satellites with TFT Display (21729)	GST INC \$199.00
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TOSHIBA Port Replicators

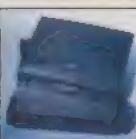
For Tecra II 750/780/8000 (79226)	GST INC \$615.00
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TOSHIBA Desk Station V+

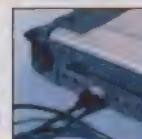
For Tecra 8000 Series (84096)	GST INC \$929.00
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TOSHIBA Carry Bags

Toshiba Friend Carry Bag (75901)	GST INC \$79.00
Leather Bag for A4 Notebooks (68408)	GST INC \$195.00



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(41608)
GST INC
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Quantum
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(82501)
GST INC
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DLTtape media
DLT2000XT 15/
30GB Tape
(68362)
GST INC
\$80.00

DLT4000 20/
80GB Tape
(71231)
GST INC
\$138.00

DLTclean
Cleaning Tapes
(97851)
GST INC
\$93.00

MaxAttach NAS System



Simplest way to add a File Server to any NT or Unix Network.

MaxA40: 40Gb
(A2201) GST INC **\$2,899.00**

MaxC80: 80Gb
(A2204) GST INC **\$3,354.00**

MaxC160: 160Gb
(A2205) GST INC **\$5,819.00**

MaxC240: 240Gb
(A9090) GST INC **\$7,349.00**



- Simply plug into your ethernet
- Only 5 mouse clicks to install....
- In 10 minutes you have 40, 80 or 160Gb of disk storage on line.
- Simple Web Browser administration.
- No NT licenses to buy!
- 95/98NT and Unix network compatible
- Now in 1 RU high models (4.5 cm high)
- Disk Spanning, JBOD or Raid level 1 built-in
- Free Reflect-It software to automatically backup you laptops or PCs.

Backup Software - TapeWare

TapeWare Lite: Single Server backup for NT, Network or Linux



(97849) GST INC **\$458.00**

TapeWare - Loaded with features yet simple to use. TapeWare is simple to install and easy to administer whether you have a single PC or a large enterprise network.

- Quick Start Wizards set up most common applications quickly
- Advanced and predefined scheduling features
- Built in free 6 slot autoloader support
- Desktop, Single Server, Enterprise and Data Centre Versions
- Options for MS-Exchange, Cluster, SQL, SAN etc

Tandberg SLR Tape Drives



"Designed for price performance and superior reliability"

SLR40 (Internal)

- 20Gb native, 40 compressed
- 3-6Mb sec, 21 Gb/hour

(A2313) GST INC **\$2,745.00**

SLR60 (Internal)

- 30Gb native, 60 compressed
- 4-8Mb sec, 28 Gb/hour

(A2206) GST INC **\$3,098.00**

SLR100 (Internal)

- 50Gb native, 100Gb compressed
- 5-10Mb sec, 36 Gb/hour

(A2207) GST INC **\$5,399.00**

ECRIX VXA-1 Tape Drive

INTERNAL (91106) GST INC

\$1,729.00

EXTERNAL (91110) GST INC

\$1,995.00



- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hr
- SCSI-2 and LVD models available
- Variable speed operation matches data throughput to your computer
- Packet based technology guarantees reliable restores
- LINUX approved
- Variety of case colours (*White, black, red, translucent)
- Compatible with most backup software

Benchmark DLT1 Tape Drive



INTERNAL
(88037) GST INC

\$3,284.00

EXTERNAL
(88038) GST INC

\$3,198.80

- 40GB native, 80GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- Ultra Wide SCSI LVD interface
- Reads DLT4000 tapes (20/40Gb Only)
- Internal or External models
- LINUX Approved
- 7 tape autoloader available
- Compatible with most common backup software
- Standard DLT form factor

Overland DLT1 Based Autoloader



"Lowest Cost DLT compatible Autoloader on the market"

- 400 Gb native, 800 Gb compressed capacity
- DLT1 Single Tape Drive included
- 10 tape capacity
- Overland DLT reliability
- LVD 68 pin SCSI Interface
- Includes 1 data tape and cable
- 20 Gb/Hr throughput.
- Optional On-site warranty.

(A0476) GST INC **\$8,564.00**

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Burwood (Melbourne)

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COMPAQ

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iPaq- Computing for the Internet Age!



iPAQ
desktop

**NO MONITOR			
iPaq Legacy			
Processor	Pentium III 500		
RAM	128Mb		
Hard Disk	8.4Gb		
Op System	Win 95/98	Win NT 4.0	Win 2000
Part #	(A2060)**	(A2341)**	(A2342)**
Rent 3 Yrs*	\$16.38	\$17.97	\$18.03
GST Inc	\$1,495.⁰⁰	\$1,640.⁰⁰	\$1,645.⁰⁰

This uniquely designed product is ideal for networked environments, mainstream office productivity applications or corporate Internet/Intranet access.

**Multibay
CD-Option
for iPaq**
(A2348)
GST Inc
\$190.³⁰

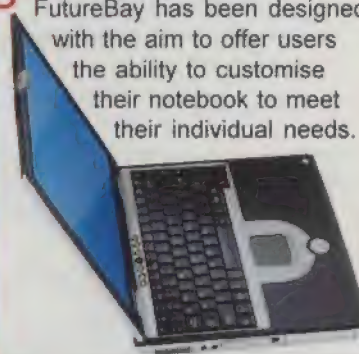
Compaq Monitors

15" S510
Monitor
(A0067)
GST Inc
\$374.⁰⁰
17" S710
Monitor
(97852)
GST Inc
\$559.⁹⁰
19" S910
Monitor
(93804)
GST Inc
\$929.⁵⁰

Presario 1700 Notebook Series

*SPEED STEP	1700XL	1700XL
Processor	PIII 650MHz SS*	PIII 600MHz SS*
RAM	64MB	64MB
Hard Disk	12.0 GB	6.0GB
Screen	14.1" TFT	13.3" HPA
CD or DVD	6x DVD	24xCD
Modem	56K	56K
Op System	Win 98SE	Win 98SE
Part N°	(A3414)	(A3412)
Rent 3 Yrs*	\$45.53	\$40.14
GST Inc	\$4,995.¹⁰	\$4,295.⁰⁰

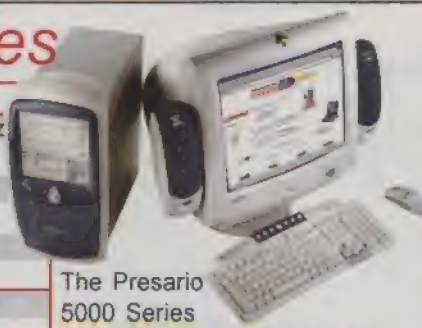
The Presario 1700 with FutureBay has been designed with the aim to offer users the ability to customise their notebook to meet their individual needs.



Presario 5000 Desktop Series

**NO MONITOR	5110	5140	5180
Processor	PIII 566MHz	PIII 650MHz	PIII 750MHz
RAM	64MB	128MB	64MB
Hard Disk	10.0GB	15.0GB	20.0GB
CD-ROM	40x CD	40x CD-ROM2	CDR-W
DVD	no	no	no
Modem	56K	56K	56K
Op System	Win 98SE	Win 98SE	Win 98SE
Part N°	(A3405)**	(A3406)**	(A3407)**
Rent 3 Yrs*	\$18.62	\$21.95	\$26.33
GST Inc	\$1,699.⁵⁰	\$2,238.⁵⁰	\$2,685.⁶³

The Presario 5000 Series delivers solid features without compromising quality or performance.



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Presario 7000 Desktop Series

**NO MONITOR	7000	7000
Processor	PIII 800MHz	PIII 933MHz
RAM	128MB	128MB
Hard Disk	30.0GB	30.0GB
CD-ROM	CDR-W	CDR-W2
DVD	8x DVD	8x DVD
Modem	56K	56K
Op System	Win 98SE	Win 98SE
Part N°	(A3333)**	(A3408)**
Rent 3 Yrs*	\$37.26	\$43.46
GST Inc	\$3,799.⁴⁰	\$4,650.⁸⁰

The Presario 7000 Series offers the customer "Smart Solutions. Powerful Performance!"



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HP Networks & Servers

HP ProCurve Switch 408

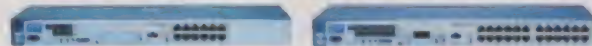
Unmanaged
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switch in a
compact sized
package.

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duplex, 10/100
autosensing on
every port.

Warranty:
Lifetime,
Exchange
Next Day

(79125)
GST INC:
\$349.00

HP ProCurve Switch 2512 & 2524



- Lowest Price 10/100 Managed Switch
- Provides a rich, layer 2 feature set
- Includes 2 built-in gigabit transceiver slots
- Auto MDI/-X on all 10/100 and 100/1000 ports
- Lifetime warranty for as long as you own the product
- Wire-speed performance on all ports
- FREE HP TopTools Management Software included

**NEW
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HP ProCurve Switch 2512
(12 port managed switch)

(A9061) GST INC:

\$Call

HP ProCurve Switch 2524
(24 port managed switch)

(A9062) GST INC:

\$Call

HP ProCurve Switch 2312 & 2324



Ideal for low-cost, unmanaged 10/100 connectivity

- Lowest Price 10/100 Switch
- Includes 2 Built-in Gigabit transceiver slots
- Brings 10/100/1000 solutions to the market
- Media-flexible ports for uplinks and server connections
- HP quality, functionality and performance
- Plug and play solution

NEW!!!

HP ProCurve Switch 2312
(12 port unmanaged switch)

(A9063) GST INC:

\$Call

HP ProCurve Switch 2324
(84 port unmanaged switch)

(A9064) GST INC:

\$Call

HP ProCurve Switch Modules

- HP ProCurve Switch Gigabit Stacking Kit
(78306) GST INC:
- HP ProCurve Gigabit-SX Transceiver
(82140) GST INC:
- HP ProCurve Gigabit-LX Transceiver
(82141) GST INC:
- HP ProCurve 100/1000-T Transceiver
(A9127) GST INC:
- HP ProCurve 100-FX SC Transceiver
(A9128) GST INC:

\$380.60

\$1,134.10

\$1,791.90

\$Call

\$Call

NEW!!!

HP ProCurve Switch 4000m



HP's 40 port managed 10/100/Gigabit switch provides a scalable low cost switching solution for organisations looking for scalable, expandable, low-cost migration to 10/100/Gigabit.

- High speed/media-flexible uplinks including 10/100Base-T, Gigabit-SX, LX, and 1000Base-T.
- Switch meshing = high availability with high performance
- Stacking capability with single IP address management

(66063) GST INC: **\$3,763.10**

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All systems
include: 7 mass
storage shelves
(4 available after
floppy, CD-
ROM & 9GB
disc), 5
expansion slots
(4 PCI, 1 ISA
combination),
integrated 10/
100 network
interface, and
easy set up
CD.



NETSERVER E-200

The Server with the best price/performance value for small businesses.

Starts your small business off on the right Track. The HP NetServer E200 offers the best value-to-performance ratio of any major server supplier.

A desktop PC may do the job when you are starting out, but as your small business expands, it quickly out grows the ability to cut corners on something as fundamental as a server. And with the HP NetServer E200 HP leads the top tier server suppliers offering full server grade technology, functionality and performance for the price of a PC.

- Intel PIII600 MHz processor with 133MHz front size bus
- 64MB registered ECC RAM standard (expandable to 768)
- 9.1GB, 7200rpm, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
- Integrated HP NetServer 10/100TX LAN adapter

Rent 3 yrs - **\$23.23***

(A1489) GST INC: **\$2,369.00**

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HP Pavilion Home PC's

HP Pavilion 6700 series

The HP Pavilion 6700 series allows you to manage daily tasks with the option to upgrade in the future. Built with Intel®, Celeron™ or PIII processors, the HP Pavilion 6700 series fully support today's leading applications. From the HP Pavilion 6700 series, you have your choice of some exciting multimedia capabilities - HP CD-Writers and digital music.

Model	6701	6751
CPU	Celeron™ 633MHz	Intel® PIII 800MHz
Memory	64MB SDRAM	64MB SDRAM
HDD	15GB	15GB
CD-ROM	48x Max CD	CDR-W Plus
Modem	V.90 56Kbps	V.90 56Kbps
Op. system	Windows® Me	Windows® Me
Monitor	15"	15"
Part number	(A9065)	(A9067)
GST INC	\$1,799^{RRP}	\$2,599^{RRP}
Monitor	17"	17"
Part number	(A9066)	(A9068)
GST INC	\$1,999^{RRP}	\$2,799^{RRP}



multimedia capabilities



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Burwood (Melbourne)**Kmart Shoppers!**

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HP Pavilion 9700 series



Model	9732
CPU	Intel® PIII 1.0GHz
Memory	128MB SDRAM
HDD	30GB
CD-ROM	CDR-W Plus
Modem	V.90 56Kbps
Op. system	Windows® Me
Monitor	15"
Part number	(A9069)
GST INC	\$Call
Monitor	17"
Part number	(A9070)
GST INC	\$4,799^{RRP}

All HP Pavilion 9700 series PCs come with a distinctive translucent blue chassis ... Making it a shade better than the average PC. Featuring Intel® Pentium® III or AMD Athlon™ processors, you can attain outstanding levels of performance. From MP3 to the HP CD-Writer Plus, the HP Pavilion 9700 series delivers advanced multimedia capabilities.

outstanding levels of performance



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Mouse

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Australia-Wide

Home Multimedia PC's

Acer Aspire

Bringing the world of multimedia into the home. The Aspire series is your ticket to a user-friendly, "family-friendly" learning experience. Uncomplicated and designed to bring families together, the Aspire series is a strong start on the computing journey.



All Aspires standard with

- 15" Monitor
- Speakers
- V.90 56k internal fax
- Microtower housing

Aspire 17" Monitor upgrade
Approx

\$150
extra- ask when placing your order!

Model	Aspire 6300R	Aspire 6300R	Aspire 6400	Aspire 6400	Aspire 6400
CPU	Celeron 600	Celeron 667	Pentium III 800	Pentium III 866	Pentium III 933
RAM	64MB	64MB	64MB	128MB	128MB
HDD	15GB	15GB	15GB	20GB	30GB
CD/LAN	50x CD	8x4x32 CD-RW	8x4x32 CD-RW	8x4x32 CD-RW	8x4x32 CD-RW
Video	Integrated UMA 8MB	Integrated UMA 8MB	nVidia TNT-2 32MB	nVidia TNT-2 32MB	nVidia TNT-2 32MB
Op. system	Win98	Win 98	Win 98	Win 98	Win 98
Part number	(A8082)	(A8883)	(A8884)	(A8885)	(A8886)
RENT*	\$18.43	\$21.66	\$24.24	\$29.08	\$45.12
GST INC	\$1,681^{.43}	\$1,976^{.37}	\$2,471^{.98}	\$2,965^{.16}	\$3,460^{.70}

All Aspires come with the following fantastic software: * Not included with Aspire 6300R

- MS Windows 98SE/1.E.5.0
- Microsoft Works 4.5
- World Book Multimedia Encyclopaedia
- KidDesk Internet Safe
- PC-Cillin antivirus

- PC-Doctor
- My Aspire Guide
- Aspire time Machine System recovery
- Aspire Recovery CD
- Hasbro Interactive Battleship**

** Not Included with Aspire 6400

- Hasbro 3 game CD: Sorry!, Yahtzee, Smart Games Challenge II**
- Acer Computer Explorer**
- Aspire webSIGHT*
- Acer Camera Software Site*



Pentium III available in some Acer Systems

Acer Power Se

At the heart of the **AcerPower Se** series is the SiS620/5595 AGPset chipset, which provides a platform for the full range of Intel® Celeron processors. The microtower housing design provides total structural integrity, durability and operational peace of mind.



Model	AcerPower Se
CPU	C566
Memory	64MB/10G
CD/LAN	50x CD/LAN
Op. system	Win 98
BONUS s/w	Lotus SmartSuite
Part number	(A8887)
RENT*	\$19.05
GST INC	\$1,614^{.95}

All Acer Powers Include:

- Acer 15" CRT monitor
- Speakers
- Integrated UMA 8MB VGA (AcerPower Se)
- 16MB Vanta 3D graphics accelerator (AcerPower Sn)
- 16-bit sound
- Microtower
- PC-Cillin anti-virus

Power 77xc Monitor upgrade
Approx

\$150
extra- ask when placing your order!

Acer Power Sn

AcerPower Sn: The 16-bit audio on a PCI interface which further enhances multimedia-computing environments and adds rich sound to your multimedia projects. The AcerPower Sn has the winning combination for small businesses.

Model	AcerPower Sn	AcerPower Sn	AcerPower Sn
CPU	PIII800	PIII800	PIII800
Memory	64MB/10G	64MB/10G	64MB/10G
CD/LAN	50x CD/LAN	50x CD/LAN	50x CD/LAN
Op. system	Win 98	Win 98	Win 98
BONUS software	Lotus SmartSuite	Lotus SmartSuite Quicken Business	Lotus SmartSuite MS Office SBE
Part number	(A8888)	(A8889)	(A8890)
RENT*	\$22.73	\$23.14	\$17.70
GST INC	\$2,074^{.29}	\$2,111^{.76}	\$2,504^{.18}

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Acer TravelMate Notebook Series

The Perfect combination of connectivity, portability & design elements.

The TravelMate 520 series all-in-one business portable from Acer heralds the arrival of a new business-computing era. Acer's latest all-in-one portable offers the versatility, performance, and dependability to make it the quintessential business productivity tool. Make your mark. Make an impression.

Acer 520
Series

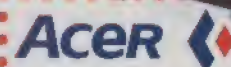


Wine
on-line?



vintagecellars.com.au

Model	520iT	521TXV
Screen	12.1" TFT	14" TFT
CPU	C550	PIII600SpeedStep
Memory	64MB	64MB
HDD	4.8GB	6GB
Graphics	8MB	8MB
CD-ROM	24xCD	NO
DVD	NO	6xDVD
Fax/Modem	56Kbps	56Kbps
LAN Card	10/100 LAN	10/100 LAN
Op. system	Win 98 SE	Win 98 SE
Part number	(A2424)	(A2425)
RENT*	\$31.36	\$43.82
GST INC	\$3,198.00	\$4,689.00



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Everyone at Acer is committed to being there for you like no one else will. That's why six out of ten of Australia's biggest IT users, use Acer PCs. And why Acer was rated No.1 in customer service and support by the Australian Personal Computer magazine survey. Our quality **TravelMate** notebooks now carry our guarantee of a 2-hour warranty service in Sydney, Melbourne, Brisbane, Canberra, Perth and Adelaide*. This means we'll fix your TravelMate notebook within two hours of you dropping it off at one of our service centres. Acer is the only computer company that can make that assurance to all its customers. Call 1300 366 567 or visit www.acer.com.au.

*Metropolitan areas only.
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Acer 600
Series



Acer 340
Series



Acer
200DX

Model	345T (CD)	345T (DVD)	200DX	602TER
Screen	12.1" TFT	12.1" TFT	12.1" HPA	13.3" TFT
CPU	PIII600SpeedStep	PIII600SpeedStep	C550	PIII650SpeedStep
RAM	64MB	64MB	32MB	64MB
HDD	6GB	6GB	5GB	12GB
Graphics	2.5MB	2.5MB	4MB	8MB
CD-ROM	24 x CD	NO	24xCD	20x4x4 CD-RW
DVD	NO	6 x DVD	NO	NO
Fax/Modem	56Kbps	56Kbps	56Kbps	56Kbps
Other	10/100 Lan	10/100 Lan	NO	10/100 Lan
OS	Win 98	Win 98	Win Me	Win 98
Part	(94817)	(94818)	(A8894)	(A2426)
RENT*	\$41.58	\$43.91	\$Call	\$53.69
GST Inc	\$4,449.00	\$4,699.00	\$Call	\$5,890.00

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Extra-light portability. Protected by a Titanium Composite top cover and a travel weight that starts at 1.4kg, the ThinkPad X Series is designed for extra-light portability that includes a bright 12.1" TFT display. About 2.5cm slim, it's the perfect mobile computing solution for users on the move who need an

extra thin system that's packed with features and performance. ThinkPad X Series notebooks are powered by Intel Mobile Pentium III processors (at 600MHz) or Mobile Celeron processors (at 500MHz) with up to 3.8 hours of battery life. No matter where you are headed, the ThinkPad X Series provides a better e-xperience.

ThinkPad X20

a better e-xperience

Model	266212M
Processor	C500MHz
RAM stand/max	64/320MB
HDD	10GB
Display	12.1" 800x600 TFT
PCMCIA support	1 Type II
Fax/Modem	56K V.90
Op System	Windows 2000
Rent TAP*	\$39.85
Part No	(A8800)
GST INC	\$4,264.⁰⁰

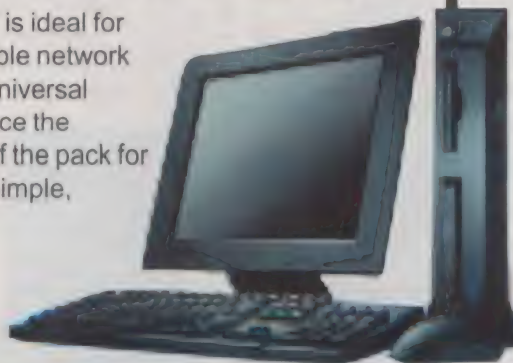


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NetVista A40p

NetVista A40p desktop is ideal for e-business. Fast, reliable network connections and IBM Universal Manageability tools place the NetVista A40p ahead of the pack for easy deployment and simple, effortless use.

* Monitor not included



Model	6579-LBA
Configuration	Desktop (4x4), PCI
Processor	PIII 733MHz
RAM stand/max	64/512MB
HDD	10GB (Ultra ATA/66)
Monitor	not included
Network Int'	Intel 10/100 Ether'
CD-Rom	optional
Op System	Windows 2000
Rent TAP*	\$24.50
Part No	(A6274)
GST INC	\$2,499.⁰⁰

Rent Smart

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Netfinity 3000

Model	84791U
Level II Cache	256KB/256KB
Processor	PII 700MHz
RAM stand/max	128/768MB
Disk subsystem	Ultra2 SCSI (PCI adapter). 9.1GB installed
HDD	72.8GB
HDD type	Ultra2 SCSI w/ SMART
Network interface	Ethernet- Integrated
CD-Rom	40x max- 17x min
Rent TAP*	\$36.76
Part No	(A7279)
GST INC	\$3,748.⁸⁰

If your business is at the point where you need a server, but don't have a big budget, the IBM Netfinity 3000 is the affordable solution. Packed with power and scalability features that support file-and-print serving, workgroup productivity applications and shared Internet access, the IBM Netfinity 3000 is the reliable network foundation you need.



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LL-T155A



- Screen size 15-inch (diagonal 38cm), resolution XGA (max 1024 x 768 dots)
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- Auto balance (automatic colour level adjustment)
- Automatic pixel converter (VGA/SVGA)
- Long-lasting backlights- up to 50,000 hours
- Power management function- max 22W during operation, down to 5W during power safe mode
- Plug and play compatible- Win 95/98
- USB for easy connection to various peripheral devices
- Uses one-fourth the space of a CRT monitor
- User- friendly design with reduced flicker is easier on the eyes.

(A2819) GST INC

\$2,259.00

PCAR10



- Intel Pentium III 650MHz processor
- 10 Gb Hard Disk drive
- 64Mb Ram (Expandable to 192Mb)
- **24 x CD-Rom drive/ 4 x CD-RW**
- 14.1" XGA low reflection TFT LCD screen
- Display resolution 1024 x 768
- ATI Rage Mobility M
- Type II slot x 2, cardbus support
- Includes 56Kbps modem
- Li-ion battery pack (2.5hrs)
- Weight 2.6kgs

(A9133) GST INC

\$5,499.00

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FO2950M

Advanced performance with convenient email functions

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- 8 ppm print speed
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- 100 speed dial locations and 20 one touch rapid dial keys.
- Laser printing 8 ppm and at 1,800 (enhanced) x 600 dpi resolution. Included printer drivers support Windows 95/ 98 / NT4.0
- 600 dpi (enhanced) B&W scanning in 256 gradations.
- Fax PC-generated documents directly from your computer.
- Send documents to any e-mail address. Scan document then send as a file attachment.
- Automatically forward incoming faxes to a designated e-mail address.

(A2549) GST INC

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AL-880



(92726) GST INC

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- High Quality 600dpi Digital Laser Multifunction (copy, print, fax, scan)
- 8cpm
- Built in Printer function: The digital copier is also an 8ppm true 600dpi x 600dpi laser printer with IEEE1284 bi-directional interface port
- Built in G3 fax with SPF function
- Easy operation from Fax Operation Panel
- Built in Scanner function, twain compliant
- Scan Once Print Many (SOPM) function
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1.3 Megapixel resolution (1.6 megapixel interpolated) 6x Precision Digital zoom (3x Optical zoom) 2" Colour LCD monitor, Interface Scan Super HAD, CCD Info LITHIUM M series battery, 12bit A/D conversion Super Resolution Converter, Automatic Focus, Automatic/Priority Aperture, Automatic/Priority Shutter, Auto/Manual/Preset White Balance Exposure control



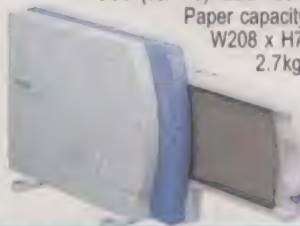
(99849) GST INC

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Digital Photo Printer

Digital Photo Printer

• Printing method: dye sublimation • Resolution: Approx 300dpi • Gradations: 256 for yellow, magenta, cyan. Over 16.7 million colours per dot • Paper size: 180x100mm (UPC-10P23E, UPC-10P34, UPC-10S01) • Printing time: approx 85 s/sheet • Interface: USB (ver 1.0) IEEE-1284 (compatible, nibble ECP) • Paper capacity: 25 sheets • Dimensions: W208 x H71 x D303mm • Weight: approx 2.7kg.



(A5052) GST INC

\$795.00

Cyber-shot DSC-F505V

Memory Stick Digital Camera

UXGA (1600 x 1200 pixel) resolution, Up to 38 shots fine 63/ std (VGA JPEG), 27 fine/49 std (XGA JPEG), 8 fine/15 std (UXGA JPEG) per 4MB Memory Stick. Interface Super HAD 1/2 CCD (2,100,000 pixels), 140 rotating Carl Zeiss Vario-Sonnar Lens • 5 x optical and 10 x Precision Digital zoom. 5 x playback zoom with trimming in 0.1 x steps



(A7100) GST INC

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Ultra Compact Projector

Light: 600 ANSI Lumens • 2.9KG • 40 to 150" Screen size • Digital Keystone Correction • 4X Digital zoom • USB, composite, S-Video, RGB, PS/2 Mouse • Remote control W/REMOT mouse & projector control • Projector station software VER2.0 • 5 Step height adjuster • Low fan noise • 2 X 0.5W Stereop speakers • Advanced auto pixel alignment • 120W UHP - 2000 HRS life at 90% original brightness.



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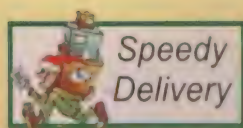
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Memory Stick Walkman

ACTUAL SIZE

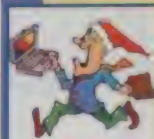
(real life size is approx 37mm wide x 96.3
high x 19.2 deep)



Memory Stick Walkman (NWMST7) - the new era network audio entertainment. With the meteoric rise in Internet popularity, and the advent of Electronic Music Distribution (EMD), the Memory Stick Walkman (TM) closes the gap between you and your favourite music. Features: *3 Line, full dot backlit LCD display *AVLS (Automatic Volume Limiting System) *Built-in Lithium Ion rechargeable battery *Completely skip free *Date/time display *High speed USB connection *Jog lever for easy operation *Mega Bass *OpenMG software supplied *Play modes: Repeat 1/All/Shuffle/AMS *Removable 64MB MagicGate Memory Stick supplied - up to 120 minutes of music *Ultra compact design *Up to 4 hours continuous playback

(A8043) GST INC

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Smaller than a stick of chewing gum, Memory Stick is the next generation of digital storage media. Imagine carrying around an entire encyclopedia, your complete medical records, a whole library of electronic books and generations of family albums in your pocket. Now imagine Memory Stick - a miniature recording media that fits every digital product you own, including your mobile phone, car, PC, Laptop, camera, Handycam, personal audio player, hi-fi, TV, photo frame and robot. And this is only a taste of what's to come. Memory stick allows information, images, sound and other digital data to move from one digital device to another. Sony has released the 8MB, 16MB, 32MB & 64MB with 128MB & 1GB in development. Transferring Memory Stick data is easy through Sony's easy-to-use Memory Stick Floppy Disk Adaptor, PC-Card Adaptor or a fast USB Adaptor.

Sony's vision of a Memory Stick universe is already a reality.



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The Quantum Snap Server is the ideal solution for upgrading your network storage. It offers the perfect combination of quick and easy installation at prices far below what you would pay for a traditional NT server. It's pre-configured to work in all major network environments, which means you really just plug it in and turn it on - with no network downtime. In fact, the Snap Server is so hassle-free, it installs in less than 5 minutes!

Performance Pentium-class processor with

- Quantum Ultra ATA hard disk drives
- RAID 0, 1 or 5
- Unlimited license, easily supports 100 clients

Network Security Integrates with NT Domain Controller and NetWare Bindery servers or local user list.

Warranty 3-year parts and labour.

Compatibility Simultaneous support for Windows 95/98 2000, NT, NetWare, UNIX and Macintosh networks and clients across TCP/IP, IPX, NetBEUI and AppleTalk.

The Award-Winning Snap Server Family

- Snap 1000 15GB (A3489) GST Inc: **\$1,159.00**
- Snap 1000 30GB (A3528) GST Inc: **\$1,739.00**
- Snap 2000 60GB RAID 0, 1 (A3926) GST Inc: **\$3,399.00**
- Snap 4100 120GB RAID 0, 1, 5 Rackmount (A8118) GST Inc: **\$5,899.00**
- Snap 4100 240GB RAID 0, 1, 5 Rackmount (A8119) GST Inc: **\$8,995.00**



**Snap!
server**

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650MHz AMD Duron Processor

- 10.2GB Ultra DMA 66 Hard Disk Drive
- 64MB PC133 SDRAM
- 4MB AGP Graphics Card (ATI Rage IIc)
- 1 x AGP, 3 x PCI and 1 x CNR Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 98 or ME
- PS/2 104-key Keyboard
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$15.72**
(A5234) GST Inc
\$1,435.00*

* Monitor Not Included

This system with 15" Compucon Multimedia Monitor:

Rent 3 Yrs** **\$19.12**

GST Inc **\$1,745.00**

Monitor price is

(25874) GST Inc **\$310.00**

Intel Celeron



600MHz Intel Celeron Processor

- PS/2 Wheel Mouse
- Windows 98 or ME
- 10.2GB Hard Disk Drive
- 64MB 133Mhz RAM
- 4MB AGP Graphics Card (ATI Rage IIc)
- 1x AGP, 1x AMR, 5x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- 10MB Combo Network Card
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$15.84**
(A5185) GST Inc
\$1,339.00*

* Monitor Not Included

This system with 15" Compucon Multimedia Monitor:

Rent 3 Yrs** **\$18.07**

GST Inc **\$1,649.00**

Monitor price is

(25874) GST Inc **\$310.00**

Intel Pentium III



733MHz Intel Pentium III Processor

- 10.2GB Hard Disk Drive
- 64MB 133Mhz RAM
- 4MB AGP Graphics Card (ATI Rage IIc)
- 1x AGP, 1x AMR, 5x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 98 or ME
- PS/2 104-key Keyboard
- 10MB Combo Network Card
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$18.19**
(A5185 + 94903) GST Inc
\$1,659.00*

* Monitor Not Included

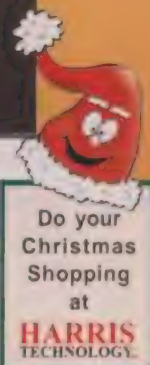
This system with 17" Compucon Multimedia Monitor:

Rent 3 Yrs** **\$22.77**

GST Inc **\$2,078.00**

Monitor price is

(25906) GST Inc **\$419.00**



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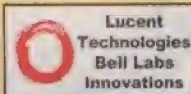
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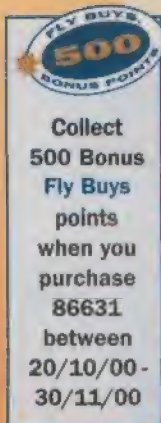


Powerful - Access up to 6000 Entries
Portable - Credit Card Sized, and weighs only 1.4 ounces, so you can take your important data with you.

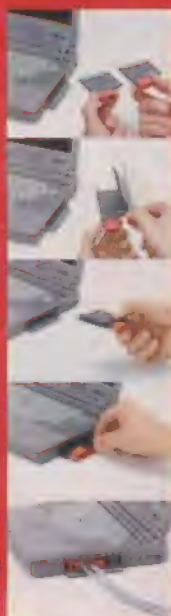
Easy to Use - Includes everything you need to get organized, synchronise with software on your computer.

- Display: 9-line, high-contrast 160 x 98 black-and-white LCD
- Memory 512K
- Size: 3-3/8" x 2-1/8" x 1/4"
- PCMCIA: Type II PC Card

(86631) GST Inc: **\$195.00**



5 Easy steps as follows



- 1 Choose Desired Realport2 Cards
- 2 Flip one RealPort2 card over and place on top of the other
- 3 Align tabs and join cards
- 4 Insert joined cards into PC Card slot of Notebook
- 5 Plug in cables

● Xircom RealPort 2

The only access cards with integrated connectors! No more hassles with fragile cables & pop-out jacks.

The Only Personalized Notebook Communications Solutions: The RealPort2 Integrated PC Card with Built-in Connectors and Mix and Match Flexibility. RealPort2 Integrated PC Cards with built-in connectors add flexibility by enabling users to choose from a wide variety of access cards that can be used alone or mixed and matched to meet communications requirements now and in the future. Combine a 56K modem, 10/100 Ethernet LAN, wireless data access via your mobile phone, ISDN and more!

Realport2 Global Access Modem

(92739) GST Inc: **\$359.00**

Realport2 10/100 Ethernet Card 16 bit

(92746) GST Inc: **\$279.00**

Realport2 CardBus 10/100 Ethernet 32 bit

(92756) GST Inc: **\$285.00**

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APC Smart-UPS 2u1000 **\$1,090.00**
(99596) GST INC

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(99597) GST INC

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- Phone/modem protection
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APC Back-UPS Pro 280si **\$269.00**
(76636) GST INC

APC Back-UPS Pro 420si **\$359.00**
(76637) GST INC

APC Back-UPS Pro 650si **\$445.50**
(76638) GST INC

APC Surge Arrest

PNote Pro

An APC SurgeArrest is your guarantee that your hardware and valuable electronics are protected regardless of lightning strikes and everyday unexpected power surges. SurgeArrest also offers the best protection from line noise which can cause glitches and errors in electronic operations and computer data.

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SurgeArrest 5 Strip
(99591) GST INC

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PNote Pro
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Intelligent Storage Solutions

29CDH-31500

(A7651) GST Inc:

\$9,329.⁵¹

29CDH-2020W

(A7650) GST Inc:

\$5,219.⁰⁰

FISC CDH

THE ALL-IN-ONE NAS SERVER

The FISC CDH from Allion is a multi-function NAS device that serves as a CD/DVD mirroring server, file server, as well as a CDR disc archive server. It is the first NAS server available in the market that combines all technologies in one device. Store it, serve it, archive it!

- Scalable to suit storage applications up to 1 Tbyte
- 128 Mbytes Buffer RAM for sustained throughput
- Network throughput up to 7 Mbytes/sec
- Supports Windows, Macintosh, OS/2, Unix, Linux Os's
- User expandable to 8 devices
- Perfect for the growing business

Got Cable or ADSL? Share it!

- Share your broadband Cable or ADSL Internet connection within minutes
- Doubles as a 4 port 10/100 switch with Linksys speed
- Allows up to 253 users, plus the built-in NAT technology acts as a firewall to protect your internal network
- Can act as either a DHCP Server or Client



16LBEFSR41

(A0203) GST Inc:

LINKSYS \$692.⁵¹

Performance Upgrades

Delivering blistering 16X DVD performance, the Shintaro DVD1600 player kit combines dedicated hardware MPEG-11 video decoding with the industry leading DVD-ROM drive from Pioneer. The result - A DVD movie player for your PC so fast that it will be begging for mercy!



10SHDVD1600

(99694) GST Inc:

\$455.⁰⁰

Powered by Sony's high-performance 32X-R x 10X-W x 4X-RW IDE CD recorder, the Shintaro CDRW100 will record a full CD in under 8 minutes! Supplied with Adaptec Easy CD Creator software and 12 blank CD's, the CDRW100 offers a complete CD production kit with the power to burn.



04SHCDRW100

(99695) GST Inc:

\$535.⁰⁰

Media



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CD-R**

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(A7652)

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**Princo
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CD-R**

80 minutes
(A7653)

GST Inc:

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**Princo
Blank
CD-RW**

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(A7654)

GST Inc:

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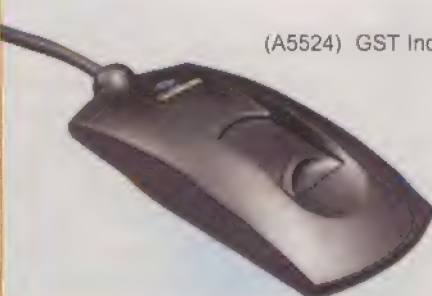
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Capacitance Finger Image Scanner

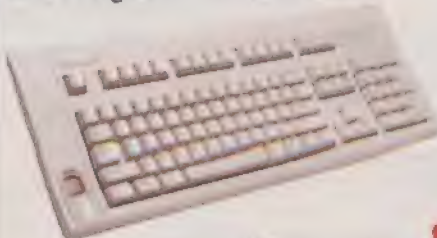
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Banking and Point of Sale

(A5453) GST Inc: **\$419.10**



SAFsite Server with 10 Users



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Security Solutions

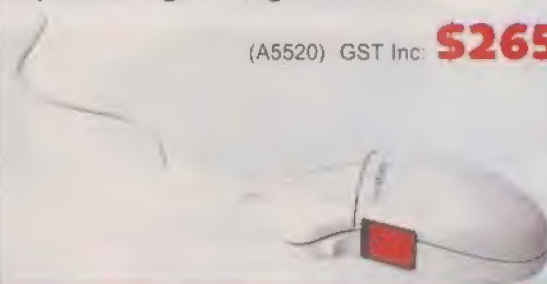
(A5511) GST Inc:

\$344.30

SecuGen

Optical Finger Image Scanner

(A5520) GST Inc: **\$265.10**



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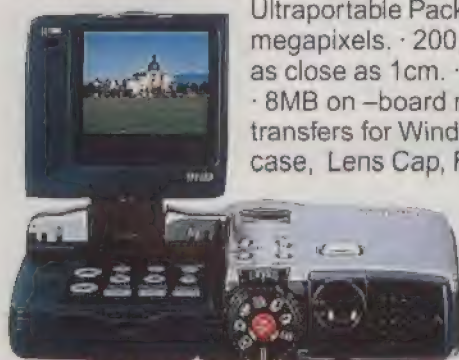
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Image Capturing Device

RICOH RDC-7



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Ultraportable Package. · 3.3-megapixel CCD delivers photo-real resolution up to 7 megapixels. · 200,000 pixel LCD monitor for viewing. · 3x optical lens zoom. · Macro as close as 1cm. · Compact flash control. · Records interviews and ideas on the run. · 8MB on-board memory expandability up to 64MB. · USB and serial port for fast transfers for Windows & Mac. · Scans text and saves to TIFF. Comes with: Soft case, Lens Cap, Rechargeable Lithium-Ion Battery, USB Cable, Serial Cables for Win/Mac, AV cable, Ricoh software for Win/Mac. Accessories: DR-3 - Remote control, 8MB, 16MB, 32MB Smart Media cards, FS-B10 - Floppy disk adapter, FS-B53 PC card adapter, AC-3 AC Adapter.



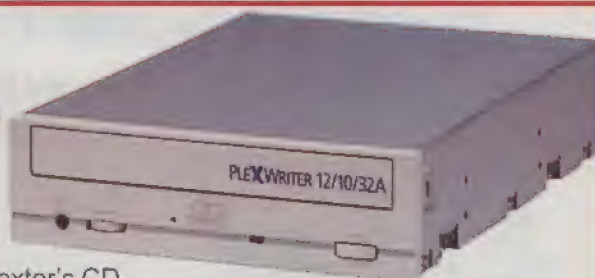
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(A8918) GST INC **\$1,999.⁹⁵**

Plextor Plexwriter 12/10/32A

ATAPI CD - Recorder/Rewriter/Reader with BURN-Proof Technology. Recently voted First Class in BEST Great stuff - tested and approved in top-secret labs of Wired Magazine September 2000. While your friends spend up to half an hour per disc burning audio CDs at 2x or 4x, Plextor's CD-RW drive blasts them out in 6 minutes. The PlexWriter 12/10/32A's name means that it records CD-R discs as 12X speed, rewrites CD-RWs at 10X, and reads back all CDs at 32 speed. Top-notch manuals and software make installation easy. The drive's accuracy is perfect - no misses or skips. Plextor are the leaders in CD-RW.

BURN Proof (Buffer Under RuN - Proof) enables you to stop writing before buffer under run errors occur and then to continue writing by tying last point of recording and the next start point.....no more drink coasters. Comes with software, cables, manuals, ready for installation.



(A4769) GST INC **\$769.⁰⁰**

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From 36GB through to 600 GB.
Works in the following networks : Windows NT, Novell, UNIX & MAC.

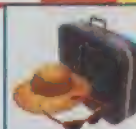
Why NAS:

- Quick installation - minutes.
- No need to take any servers down to add to your network.
- Easy to Configure.
- Scaleable - you simply add storage as you need it.
- Works with all your existing technology including your back-up software.
- Very low Total Cost of Ownership.
- Perfect solutions for small to medium office & work groups

Our storage is meant to be easy, low cost and secure. Optistor is Australia's leading NAS assembler. 10 years of providing storage solutions.

36GB SCSI HDD RAW 5 Bay (A2515) GST INC **\$7,882.⁶⁰**

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Take the Work out of Networking

10/100MBPS FAST ETHERNET SWITCHES



The NETGEAR FS105 and FS108 feature 5 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible. Compact and easy to install. Vista jacks with built-in LEDs.

FS 105
5 Port Autosensing

(84722) GST Inc:
\$190.30

FS 308
8 Port Autosensing

(77242) GST Inc:
\$479.60

FS 108

8 Port Slimline

(70905) GST Inc:
\$277.20

FS 116

16 Port Autosensing

(A5347) GST Inc:
\$558.80

The NETGEAR FS516 & FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516

16 Port Autosensing

(60522) GST Inc:
\$918.43

FS 524

24 Port Autosensing

(77549) GST Inc:
\$1,108.80

TAKE THE WORK OUT OF NETWORKING NETWORK STARTER KITS



Free
modem sharing
software

The NETGEAR Network Starter kits give Windows users everything they need to start networking right away at either 10 Mbps or 100 Mbps. The kits containing 10/100 PCI cards, a hub or switch, network cables, modem sharing software and an easy to read how to guide. Within a few minutes, you will be able to share files and printers, exchange e-mails, play interactive games and share access to the Internet.

SB 105

5 Port 10 Mbs starter kit

(A3293) GST Inc:
\$136.00

FB 105

5 Port switch starter kit

(A3935) GST Inc:
\$239.00

Netgear offers FREE 24-hour phone support



10/100 DUAL SPEED HUBS

These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix & match 10 and 100Mbps PCs, servers and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.

DS 104

4 Port Slim Line

(70795) GST Inc:
\$155.30

DS 309

9 Port

(87479) GST Inc:
\$369.76

DS 106

6 Port Slim Line

(84721) GST Inc:
\$215.00

DS 508

8 Port Stackable

(18738) GST Inc:
\$443.30

DS 108

8 Port Slim Line

(18755) GST Inc:
\$225.50

DS 516

16 Port Stackable

(18747) GST Inc:
\$609.64

DS 116

16 Port Slim Line

(81519) GST Inc:
\$378.40

DS 524

24 Port Stackable

(69474) GST Inc:
\$768.90

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GIGABIT SWITCHES

These 3 new gigabit switches from Netgear make it possible for small businesses and branch offices to fulfill requirements for higher bandwidth as their networks become increasingly congested. The switches provide customers a faster server connection and allow multiple Fast Ethernet users to access the server at 100 Mbps at the same time.

FS 510T

(A1209) GST Inc: **\$1,767.70**

Eight switched 10/100Mbps ports + two 1000Mbps port (Category 5)

FS 518T

(A1374) GST Inc: **\$2,866.60**

Sixteen switched 10/100Mbps ports + two 1000Mbps ports (Category 5)

GS 504T

(A1375) GST Inc: **\$3,260.40**

Four full-duplex Gigabit Category 4 ports

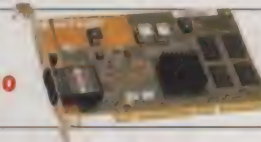
Please Note that Fibre Gigabit Switches are also available

GIGABIT NETWORK CARD

Gigabit Network Interface Card

GA 620T

(A1382) GST Inc: **\$694.10**



ROUTERS

CABLE/DSL ROUTER

Share data locally or through the Internet. Usable to 253 clients at a time, this power-packed router with integrated 4-port 10/100 Mbps switch conducts your Internet connection so that multiple PCs can use your DSL or cable modem, no additional hubs or switches needed. You'll pay for only one IP hookup for shared broadband access, yet you can also limit Internet availability, PC by PC. On top of that, the multi-functional RT314 can be configured as a DHCP server or client.

RT 314

(A8862) GST Inc: **\$479.76**

CABLE/DSL INTERNET GATEWAY

Connect multiple PCs to share single IP address. The NETGEAR RT311 provides NAT service that allows up to 32 users on your 10/100 network to share the high-speed Internet connection. At the same time it also provides firewall protection to guard your network against hackers and unauthorised access from the Internet.

RT 311

(97719) GST Inc: **\$372.90**

ANALOG MODEM ROUTER

Connect multiple PCs to the Internet Router + integrated 56K modem + integrated 4-port 10BaseT hub • DHCP server • Dynamic NAT+ • Dial-on-Demand-routing • Hi/fn (STAC LZS) compression • 5 year warranty •

RM 356

(70197) GST Inc: **\$543.40**

ISDN ROUTER

Latest technology with ease-of-use designs. The ideal router for Internet access, LAN to LAN connection and remote access for a single user, small business or branch office. Includes built-in ISDN TA, 128 MultiLink PPP, DHCP Server, Dynamic NAT+, Dial on Demand Routing.

RT 338

(97718) GST Inc: **\$624.80**

10/100 Mbps ISDN Router. Includes caller ID.

RT 328

(68900) GST Inc: **\$577.50**

10Mbps ISDN Router

PRINTER SERVERS



The NETGEAR print servers let you share any parallel printer among all users on the network without having to dedicate a PC for print serving & without complex setup & configuration. These print servers connect directly to the network & can be placed anywhere convenient to the users.

PS 105

(67225) GST Inc: **\$209.00**

10Mbps Print Server, 4 port hub, BNC connection, 1 parallel printer port.

PS 110

(67226) GST Inc: **\$232.10**

10/100 Print Server, 1 x 10/100 auto-sensing ethernet port, 2 parallel printer ports

PS 113

(A3287) GST Inc: **\$375.10**

10/100 Mbps Print server, 1 x 10/100 auto-sensing ethernet port, 3 parallel printer ports

10MBPS ETHERNET HUBS



Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support option • Limited lifetime warranty • Easy plug and play installation

EN 104TP

(53456) GST Inc:

4 Port Slim Line

\$65.00

EN 108TP

(53458) GST Inc:

8 Port Slim Line

\$97.90

EN 116

(53459) GST Inc:

16 Port Slim Line

\$215.60

EN 516

(17425) GST Inc:

16 Port Rackmount

\$232.10

EN 524

(17435) GST Inc:

24 Port Rackmount

\$298.10

• 16 or 24 10BASE-T ports • Easy installation • Vista network port with built-in LEDs • BNC/AUI backbone support • Internal power supply

NETGEAR

FA 311

Ethernet Adapter 10/100 PCI



(A1372)

GST Inc:

\$53.90

FA 312

Wake on Lan card

(A1373)

GST Inc:

\$58.30

FA 410

PCMCIA 10/100 Mbps Network Card



(60071)

GST Inc:

\$157.30

FA 510

Network Card for Notebook PC

(81319)

GST Inc:

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DES-1024R 24 Port Switch for Workgroups



24 port auto negotiating 10/100Mbit Switch (NWay). Supports UTP/STP cables. MDI-II Uplink ports Support Full/Half duplex. Provides cut-through and fast store & forward switching. Rack mountable.

(76740) GST Inc: **\$979.00**

DES-1016R 16 Port Switch for Workgroups

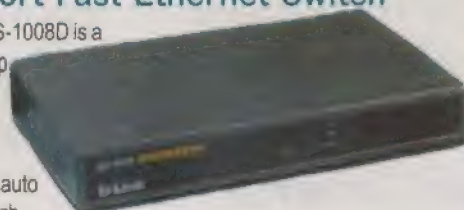


Built with advanced functions, these switches are designed for the workgroups with advanced requirements. Powerful yet easy to use, they allow users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidth, boost response time and satisfy heavy load demand. Rack mountable.

(69456) GST Inc: **\$785.00**

DES-1008D 8 Port Fast Ethernet Switch

The D-Link DES-1008D is a powerful desktop Dual Speed 8-port 10/100Mb Ethernet/Fast Ethernet NWay auto negotiating Switch.



(98254) GST Inc: **\$309.00**

DI-701 Cable ADSL Gateway

The D-Link DI-701 Residential Gateway protects your computers from hackers or unwanted users. It is the easiest and safest way to share your high-speed Internet connection with a DSL Modem or Cable Modem.



(98249) GST Inc: **\$399.00**

DWL-1000AP D-Link Air Access Point

Fast 11 meg Performance. Build The Size of Your Wireless Network, or Extend Your Existing Wired Network.



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(A8488) GST Inc: **\$995.00**

DWL-650 D-Link Air Wireless PCMCIA Network Card

11 Megabit Performance. IEEE 802.11b. Make any note book truly portable within your office environment.



NEW
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(A8486) GST Inc: **\$319.00**

Other products available from D-Link

Description	Part #	GST Inc
D-Link DP-303 10/100 Print Server (3xParallel Port)	(A8876)	\$398.00
D-Link DU-560M External V.90 56K Voice/Fax/Data Modem (USB)	(98306)	\$118.80
D-Link DFM-560I Internal PCI V.90 56K Voice/Fax/Data Modem	(74361)	\$72.60
D-Link DES-3225G 22+2 port 10/100Mbps Mang Switch W/ V-Lan	(90755)	\$1,998.00
D-Link DFE908DX 8 Port 10/100Mbps Dual Speed Hub	(60558)	\$287.10
D-Link DFE-916DX 16 Port 10/100Mbps Dual speed hub	(87207)	\$558.80
D-Link DFE2624x24-port 10/100Mbps Stackable Dual Speed Hub	(98307)	\$1,169.00
D-Link DP-602 2 Port Internet Network Server	(81535)	\$369.00
D-Link DFE-530TX PCI-Bus 10/100Base TX Fast Ethernet Adapter	(62956)	\$37.40

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Finance methods are subject to approval.



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Connectivity where & when you need it

3Com® OfficeConnect™

Dual 56K Modem

This product is designed for non-technical users that need radical simplicity, high speed Internet access as well as local file and print sharing capability.

(A3358)

GST Inc **\$779.00**

OfficeConnect Dual 56K LAN Modem brings low-cost, high-speed Internet and Ethernet connectivity to your Small Office/Home Office computers in just minutes!



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Camberwell (VIC)
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Not all products are in-store, but consulting & advice available on all items

3Com® Megahertz® 10/100 LAN+56K

Global Modem CardBus PC Card

The 3Com® Megahertz® 10/100 LAN+56K® Global Modem CardBus PC Card delivers high-speed LAN and modem connections the world over. A 32-bit CardBus architecture ensures true 100 Mbps LAN performance and the V.90 56K standard delivers high-speed modem downloads. Plus, its durable autosensing XJACK® connector eliminates the need to carry any cables.

(99215) GST Inc

\$457.00



3Com® Megahertz® 10/100 LAN

CardBus PC Card with XJACK®

Get desktop manageability in a PC Card with the 3Com® Megahertz® 10/100 LAN. CardBus PC Card. XJACK® connector delivers durable connections without carrying or losing cables. And this PC Card provides true 100 Mbps Fast Ethernet performance in 32-bit CardBus notebooks. It features low power consumption, guaranteed compatibility, and DynamicAccess® technology.

(A3766) GST Inc

\$268.40



* Capable of receiving downloads at up to 56 Kbps and sending at up to 31.2 Kbps. Due to IC/FCC regulations on power output, receiving speeds are limited to 53 Kbps. Actual speeds may vary. Requires compatible analog phone line and server equipment. See www.3com.com/56k/ for details.

3Com® AirConnect™

11 Mbps Wireless LAN Solution

Dynamic rate shifting and load balancing optimize connectivity, while access control features provide security. AirConnect simplifies network setup with its PowerBASE-T feature and Site Survey Utility. Once installed, the SNMP management facility and Web-based tools ensure easy network management and configuration.

3Com AirConnect™ Wireless LAN

Starter Pack (A1867) GST Inc **\$2,889.00**

3Com AirConnect™ Wireless Access Point

(A1869) GST Inc **\$1,935.00**

3Com AirConnect™ 11Mbps Wireless LAN

PC Card (A1868) GST Inc **\$354.20**

AirConnect 11Mbps Wireless LAN PC Cards and Access Points deliver **simple, reliable and manageable wireless connections** at Ethernet speeds.



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E-mail: sales@ht.com.au

Delivery
Australia-Wide

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Multi-Server Controllers

Control up to 256 network servers with a single monitor, keyboard & mouse

3 Year Warranty

ServerLink to computer cable

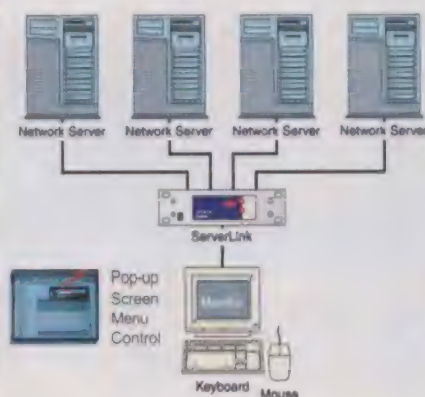
Each end of the cable fans out into three connectors. 2m cable for PS/2 mouse, keyboard and monitor (63972) **GST INC \$29.00**

5m cable (63976) **GST INC \$65.00**

2m cable for AT/Serial mouse, keyboard and monitor (63974) **GST INC \$29.00**

5m cable (63977) **GST INC \$65.00**

With a ServerLink KVM switch you can monitor and fully control up to 256 network servers with just one monitor, keyboard and mouse. Save money on expensive monitors, create more working space and cut down on your power costs.



Designed and manufactured in Australia by an award winning engineering company, ServerLink is packed with features, providing total control of your ever expanding network.

- Select servers via On-Screen-Display or Front Panel
- Name servers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic server monitoring
- Standard cables used throughout
- Cascadeable to control up to 256 servers
- 8 and 16 port models 19 inch rack mounted design
- Australian designed and manufactured

FROM **\$349.⁸⁰**

ServerLink™

- EPROM upgradeable for future technology
- Supports PS/2 and Serial mouse emulation



SL-401E	4 Port ServerLink Controller for PS/2 only	(71652) GST INC \$349.⁸⁰
SL-401	4 Port ServerLink Controller	(63724) GST INC \$737.⁰⁰
SL-801	8 Port ServerLink Controller	(63777) GST INC \$1,230.⁹⁰
SL-1601	16 Port ServerLink Controller	(63778) GST INC \$2,069.¹⁰

SERVERLINK INFINITY

**PS-2
ONLY**

- Password protection for security
- Flash ROM upgradeable for future technology

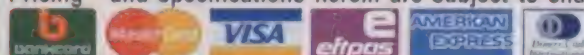


SL-821	8 Port ServerLink Infinity controller	(97888) GST INC \$1,069.⁰⁰
SL-821-P	8 Port ServerLink Infinity controller incl 8x2m Cables	(97889) GST INC \$1,239.⁰⁰
SL-1621	16 Port ServerLink Infinity controller	(97890) GST INC \$1,796.³⁰
SL-1621-P	16 Port ServerLink Infinity controller incl 16x2m Cables	(97891) GST INC \$2,127.⁴⁰

NOV
30

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Finance methods are subject to approval.

Australia's Leading Data Communications Products

NetComm Roadster II 56 Ultra

The Roadster II 56 Ultra is a voice/data/fax modem which lets you transmit and receive faxes and data directly from your desktop. Get on-line in minutes. With UltraConnect technology built-in, this 56Kbps modem connects to your ISP faster.

The Roadster II 56 Ultra is a great value package to suit online gamers, small office user and the Internet power user. Its ease of use also makes it ideal for the first time user.

- Supports Dual K56Flex & V90 Technology
- External Data / Voice / Fax and Speakerphone modem
- Slim-line design Error correction and data compression,
- Distinctive Ring Simultaneous Voice and Data
- Maximum speed of 56,000bps (download only), 33,600bps, V.34, V.32bis, V.42bis, V.42, MNP2-4, MNP5, MNP10EC,
- Plug n' Play



(A8866) GST Inc:

\$198.00

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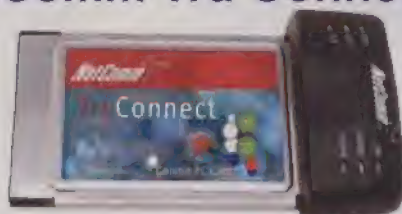
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NetComm Tru Connect

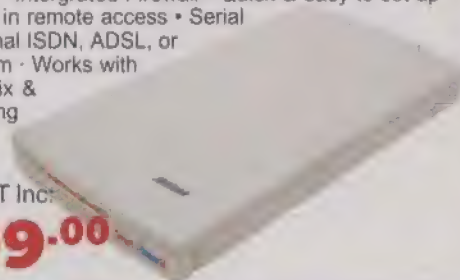


A convenient combo card which integrates Ethernet connectivity and 56K Modem with built-in connectors. Uses a single PC Card slot for both your LAN and Modem connection making it the easiest, most cost effective solution for mobile users. 10/100 capabilities, 56K and V.90, includes fax & voice s/ware.

(99747) GST Inc: **\$435.60**

NetComm Smart I-Share 56

Share Internet access the secure easy way with the Netcomm Smart I-Share 56. Allows everyone in your office or home to share the one internet account. No need for multiple internet accounts & phone lines. • Shared internet access • Integrated 56K modem • Integrated 4 port Ethernet hub • Integrated Firewall • Quick & easy to set up • Supports dial in remote access • Serial port for external ISDN, ADSL, or analog modem • Works with Windows, Unix & Linux operating systems.



(A8868) GST Inc:

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vintagecellars.com.au

Cyber Sentinal

Cyber Sentinal automatically filters and alerts via email against undesirable Internet traffic. It is the most advanced Internet monitoring software available. Includes Free Internet Access! Is ideal for home, school, library or office use. Protects against unwanted illegal downloads of pornography. Lets you decide what they access on the Internet and when they can access it. Parents can determine how much time is spent on the Internet. Allows or denies access to email news groups, real time chat groups or web browsing by the individual user. Monitors all Windows-based applications in real-time.



(A8872) GST Inc:

\$69.00

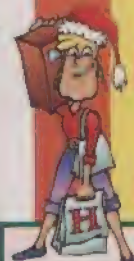
Banksia Wave 56K

The revolutionary design of the Banksia Wave takes up less desk space than almost any other product on the market. Allows you to use your PC just like a hands-free telephone with up to 9 password protected mailboxes. Dual V90 and K56flex compatibility. Simultaneous Voice & Data. Built in Speakerphone and VoiceMail. Digital line protection. Includes desktop faxing and voice software.



(A887) GST Inc:

\$199.10



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SoundMan S-4

(A5010)

GST Inc:

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NEW!

WingMan Attack

(81510)

GST Inc:

\$48.40


SoundMan S-20



Delivers high-definition sound, solid bass for your favourite CD/MP3 songs. Compact, attractive styling. Remote control with headphone jack. Includes digital music CD. 2-year warranty.

(A5011) GST Inc:

\$99.00

SoundMan SR-30



Enhance your gaming experience with realistic surround sound. Powerful subwoofer and 4 satellite speakers in an attractive package. Remote control with headphone jack. 2-year warranty.

(A5343) GST Inc:

\$165.00

WingMan Force 3D

Feel the action in your games! Logitech's new force feedback joystick lets you feel weapon recoils, explosions and much more. The space-saving design takes up minimal room on your desktop. Includes a twist handle function, seven programmable buttons, an 8-way hat switch and a high-precision throttle. Requires USB connection.

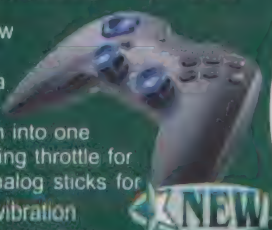
FORCE FEEDBACK

(A4998) GST Inc:

\$138.60

WingMan RumblePad

Just try and hold on to the new WingMan RumblePad! This feature-rich controller packs a throttle, dual analog mini joysticks and realistic vibration into one awesome unit. You get a sliding throttle for precise speed control, two analog sticks for full 360 degree rotation, plus vibration feedback to let you feel every turn, bump and dip in your games. Requires USB connection.



(A5387) GST Inc:

\$79.20

WingMan Formula GP

Precision-engineered for speed and control. Experience the thrills of driving a race car! Rubber hand grips provide more comfort and control while driving fast. Includes two wheel-mounted gear shifters, four action buttons, dual clamping system and realistic gas and brake pedals. Requires game port connection.



(A7062) GST Inc:

\$129.95

WingMan Formula Force GP

Feel what really happens on the racetrack! Logitech's new force feedback steering wheel lets you feel the road, bumps, walls and crashes. Rubber hand grips provide comfort and precise steering control. Includes two wheel-mounted gear shifters, four programmable buttons, dual clamping system and realistic gas and brake pedals. Requires USB connection.



(69366) GST Inc:

\$209.00
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A5011, A5343, A7062, 69366, 80121 or A2833 between 20/10/00 - 30/11/00

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QuickCam™ Express

QuickCam™ Web

Snap stills. Shoot video. Email them anywhere in one click. Make live video calls! **QuickCam™ Express**

- The simple way to get closer™
- Capture stills and video instantly
- E-mail images with a single click
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- Over 3 million QuickCams sold
- USB connector for easy installation



(80121) GST Inc:

\$89.10


The redesigned Logitech QuickCam Web has everything you need to capture video, send video e-mail, make live video calls, post web albums, broadcast over the Internet and more. With its integrated microphone and excellent assortment of easy-to-use software, QuickCam Web is the perfect Internet video camera for everyone.



(A2833) GST Inc:

\$175.00

iFeel™ Mouse

This mouse enhances your computing experience with gentle vibrations as you move around the web and desktop. Feel your way around pull-down menus and dialog boxes. No more issues with too small print or information clutter, now you can feel where your mouse goes!



(A7953) GST Inc:

\$99.00

Cordless Wheel Mouse Special Edition

Personalise your mouse with the three different colored snap-on backs. The Cordless Wheel Mouse frees you from cords that catch, tangle and limit your movement. The rounded shape is comfortable for left or right hand. 5-year warranty.



(A2300) GST Inc:

\$79.20

Cordless Desktop iTouch

A cordless keyboard and cordless wheel mouse combination to free you from cords that tangle. No pointing at the computer or clear path required. With convenient iTouch Internet and multimedia controls. Five-year warranty.

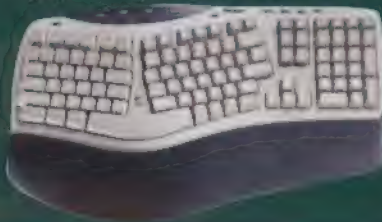


(82772) GST Inc:

\$199.00

Cordless Desktop Pro

Cordless keyboard designed for easier typing and contoured soft-touch cordless wheel mouse free you from tangled cords. Innovative mouse design maximises comfort and control. Five-year warranty.

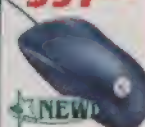


(87605) GST Inc:

\$219.00

MouseMan Wheel Optical (A3057)

GST Inc:

\$97.90


Mini Wheel Mouse (97717)

GST Inc:

\$70.40


Wheel Mouse Optical (A5318)

GST Inc:

\$69.00


WingMan 4 Port Hub (82591)

GST Inc:

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Deluxe Access 104 Keyboard (60467)

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Dynamalink Internal 56k V.90 Modems

ISA: All the features of the External. Full Hardware w/ jumpers.

5-Year Warranty.
(77577) GST INC

\$118.⁸⁰

PCI: PnP, Send & Receive Faxes, Phone Answer Machine.
(72909) GST INC

\$73.⁷⁰

PC-Card

- PCMCIA V.90 56k Modem
- Send & Receive Faxes
- 5-Year Warranty

(A2831) GST INC
\$145.¹⁰

Dynamalink 56K V.90 Modem

"Good value for money... ease of setup and use is excellent... consistently connects at high speeds." *PC World Nov 99*. • V.90 / K56flex dual-mode for high Internet compatibility • Plug & play, plus friendly QuickGuide for easy installation • Send and receive faxes from your PC • Supports FaxStream DUET, Caller ID, Speakerphone Mode & VoiceMail.



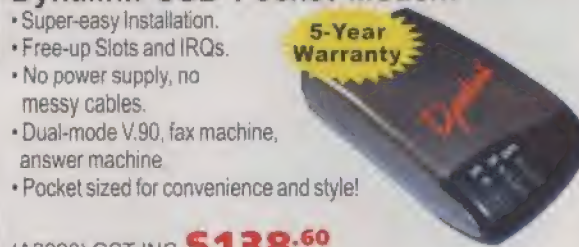
5 Year
Warranty

(54361) GST INC

\$128.⁷⁰

Dynamalink USB Pocket Modem

- Super-easy Installation.
- Free-up Slots and IRQs.
- No power supply, no messy cables.
- Dual-mode V.90, fax machine, answer machine
- Pocket sized for convenience and style!



5-Year
Warranty

(A2298) GST INC **\$138.⁶⁰**

NEW!

Dynamalink USB WebCam

- Turn your PC into a home video workstation.
- Affordable & simple video conferencing.
- Capture video and digital snapshots.
- E-mail video clips with sound
- Home security capabilities.
- Video software VP-EYE suite included.
- USB simplicity.



(A2832) GST INC **\$97.⁹⁰**

Dynamalink TV Tuner Video Capture Card

"One of the two best cards in terms of picture quality" *APC, July 9*. Watch TV on your PC & capture incoming video (e.g. from CamCorder). Fully featured, including Teletext & remote control. Resizable window, right up to full-screen (640x480).



Standard: (72860) GST INC **\$118.⁸⁰**

With FM Tuner: (78482) GST INC **\$145.²⁰**

Verbatim

Storage for life

Full Product Info:
www.verbatim.com.au

Verbatim Signature III Colour CD Printer

The Signature III Colour CD Printer is a new, third generation ink-jet CD Colour printer from industry leader Primera Technology. It combines the fastest print speed ever offered with the highest print resolution available in the world today: 1200x1200dpi for a stunning 1.44 million pixels per square inch.

(89186) GST Inc **\$2,699.⁴⁰**

Also available, the Champion Comet is the first economical, desktop printer loader designed for the Signature II and III printers. The loader stacks up to 50 printable discs, then after printing, the discs are deposited into the output tray.

Comet Autoloader for Signature Printers

(97769) GST Inc **\$2,652.¹⁰**

Verbatim Slim-line PC Card CD-ROM Drive



Add a CD-ROM to your Laptop!

This 24xCD-ROM can connect to any PC Card enabled PC or Notebook and is ideal for mobile computing for notebook users with no CD-Rom drive built-in. The drive is plug-and-play making installation a breeze and the slim-line tray reduces the size of traditional external PCMCIA CD-ROM drives through its lightweight and low profile design. The control panel on the top of the case allows for easy playback of audio CD's

(97766) GST Inc **\$315.⁷⁰**

Verbatim CopySmart 4x4x32 CD Duplicator



Stand-alone or PC connected one-to-one duplicator able to record to both CD-R and CD-RW media. 4x CD-R, 4x CD-RW copy functions. Simple 4 button interface allowing Speed selection, Test, Copy, Compare and Quick Erase. PC based Data and Audio copying Software included.

4x Write, 4x ReWrite, 32x Read

(92173) GST Inc **\$1,397.⁰⁰**

Verbatim PCI Firewire Card- 4 ports



Update your PC with firewire! With the included Ulead Video Software and cable you can download digital video camera to your hard drive. 6 port card and repeater cards also available.

(90689) GST Inc **\$176.⁰⁰**

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Zip 100MB disk:

(23772) GST Inc:

\$17.60

10-pack:

(21889) GST Inc:

\$185.00

Zip PCMCIA SCSI
accelerator card

(35145) GST Inc:

\$173.80

Zip ISA SCSI
Zoom accelerator
card

(21888) GST Inc:

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carry case

(31823) GST Inc:

\$46.20

Zip parallel cable

(46305) GST Inc:

\$38.50

Zip SCSI cable

(46304) GST Inc:

\$36.30

Zip disk labels

20-pack

(48059) GST Inc:

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Zip 6-disk wallet

(35146) GST Inc:

\$25.30

Jaz 1GB disk

(24218) GST Inc:

\$158.40

3-pack

(32844) GST Inc:

\$449.90

Jaz PCMCIA

SCSI card

(44744) GST Inc:

\$215.60

Jaz universal

power supply

(35154) GST Inc:

\$48.40

Clik!Power Supply

(78925) GST Inc:

\$28.60

zipCD The rewriteable CD drive from iomega.

CD-RW Internal

iomega ZipCD Internal drive is the ideal way to store, share and archive information in a common 650MB format. Compatible with Windows 2000. Also ships with Adaptec Easy CD Creator v4.02c and Direct CD 3.01.

8x4x32

(97712) GST Inc: **\$399.³⁰**

12x4x32

(A5391) GST Inc: **\$635.⁸⁰**

zip

250MB USB

(82633) GST Inc: **\$323.⁴⁰**

Provides high-capacity storage in an easy-to-use format that can go from desktop to laptop quickly and reliably. Sleek new design. Connect via USB port or through PCMCIA card version which requires no additional power cables. Backward compatible with 100MB Zip media

Drive USB/PC Card Combo

(82780) GST Inc: **\$388.³⁰**

jaz

2GB External

(78941) GST Inc:

\$618.²⁰

The external Jaz 2GB drive is faster than many hard drives, has a full 2GB of storage space in each removable disk.

Disk Single

(61652) GST Inc: **\$167.²⁰**

Disk 3-Pack

(62721) GST Inc: **\$501.²⁰**

zipNEW

100MB USB Starter Kit

(A2308) GST Inc: **\$259.⁰⁰**

USB Easy to connect.

Comes with 3 disks.

Plug it in, connect the USB cable to the computer, and install the iomegaWare™ software. Done!

USB CD-RW External

The ZipCD™ external USB drive reads, writes & rewrites most CD formats. You can use it to record, back up, & share your files. •It's portable & hot-swappable, letting you connect it to all USB-enabled computers without rebooting. •It enables you to record & erase ZipCD™ discs up to 1000 times. •Enable PC & Macintosh® computer users to record, archive, share, & distribute up to 650MB of data on a common CD format.

4x4x6

(92623) GST Inc: **\$497.²⁰**

Your life is safe here!

MEGA TWINS

ZIP CD & ZIP 100MB

(A5399) GST Inc: **\$469.⁰⁰**

Introducing the new MegaTwins- the 2-in-1 complete data and entertainment storage solution. Offering a ZipCD Internal drive, and a Zip 100MB Internal Atapi drive all in one pack, the MegaTwins is the complete solution for managing your information. Also comes with CD-R and Zip 100MB media.

klik

PC card drive

Removable solution for notebook users. Store, protect and share important information on a 40MB Clik! (1 disk included).

USB docking station

(A2306) GST Inc: **\$119.⁹⁰**

Drive PC card & disk

(78902) GST Inc: **\$259.⁰⁰**

Drive Mobile

(76743) GST Inc: **\$415.⁰⁰**

Disk 10-Pack

(75985) GST Inc: **\$185.⁹⁰**

xmas PROMOs

STIMULATE YOUR CYBER SENSES

Announcing an exciting new promotion from iomega sure to stimulate your Cyber senses! With any purchase of an iomega Zip, Jaz, Clik! or ZipCD drive from 1 October to 31st December. When you register your warranty, you can enter the draw to win the latest in digital technology. Up for grabs are MP3's, DVD's, IPaq's and more!

See www.ht.com.au/cat/iomega for more info on these products

The following items are **Windows ME compatible** • Zip 100 (Parallel, SCSI, ATAPI, USB) • Zip 250 (Parallel, SCSI, ATAPI, USB, Firewire) • Jaz 1GB (SCSI, Parallel, USB) • Jaz 2GB (SCSI, Parallel, USB) • ZipCD (All speeds and interfaces) • HipZip • Clik! PC card drive (PC Card drive and PCMCIA adapter).



YAMAHA

For the latest pricing have a look at this Web Direct link:

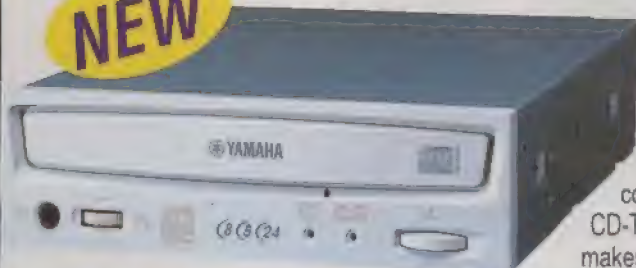
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YAMAHA CRW8824 Series

Yamaha leads the way again with the new 8X re-writeable format, just established. As well as CDR writing of a full disc in around 9 minutes, you can re-write at 8X as well, when using the new 8X rewriteable discs. Other improvements include 24X Digital Audio Extraction for fast audio disc compilations, a newly designed optical pickup and support of CD-Text. Improved packet written disc reading performance makes CDR reading and writing faster and easier than ever.

(8)(8)(24)
WRITE REWRITE READ

- 4 Mb Buffer
- New optical pickup design
- 24X audio extraction
- A full disc, on a CDR or an 8X CD-RW disc, in around 9 minutes!!

**NOW AVAILABLE IN IEEE-1394/
FIREWIRE EXTERNAL KIT**

with PC software!!!

(A7214) GST Inc: **\$729.³⁰**

CRW8824EVK- E-IDE kit, complete with Adaptec Easy CD Creator, Direct CD V3.0, Take Two backup software, power cable, screws, manual, Australian Warranty.

(A1468) GST Inc: **\$425.⁰⁰**

CRW8824SVK- SCSI Internal Kit, with Adaptec Easy CD Creator, Direct CD V3.0, Take Two backup software, power cable, screws, manual, Australian Warranty. No SCSI Card Incl.

(A1469) GST Inc: **\$499.⁰⁰**

CRW8824SXVK- SCSI External Kit, with Adaptec Easy CD Creator, Direct CD V3.0, Toast for Mac V4.1, Take Two software, power cable, manual, Australian Warranty. No SCSI Card or Cable.

(A1471) GST Inc: **\$617.⁰⁰**

YAMAHA SPEAKERS

YSTM40 **NEW**

2x12 W speakers - a quality desktop pair. Dual analogue inputs. Advanced Servo Technology for deeper bass.

(99555) GST Inc: **\$119.⁰⁰**

YSTMS30

3-piece Powered Multi-media speakers/sub-woofer with 30 watts of power & magnetic shielding to eliminate monitor distortion.

(86029) GST Inc: **\$132.⁰⁰**

YSTMS55D

Satellite/Sub "Killer" system, with 80 watts RMS. 20W and 20W (left and right) and 40W SubWoofer. 2 Analogue & 1 USB Input. White in colour.

(81345) GST Inc: **\$257.⁰⁰**

Yamaha audio quality makes such a difference to your desktop!

Model:	YSTM8	YSTMS30	YSTMS35D	YSTM40	YSTMS55D	YSTMSW8	YSTMSW10
Description:	Full range powered monitor speaker pair	3-piece powered speakers & sub-woofer system	3-piece powered speakers & sub-woofer system	Quality desktop pair.	3-piece powered speakers & sub-woofer system	Powered subwoofer	Powered subwoofer wooden cabinet
Watts:	2x 5w	2x 6w speakers, 18w subwoofer	2x 6w speakers, 18w subwoofer	2x 12w speakers	20w speakers, 40w subwoofer	15w	25w
Features:	Ashtonishly deep bass. Subwoofer and headphone output jacks. Dual stereo inputs.	2" Satellite speakers for brilliant highs. Deep, powerful bass to 45Hz.	USB architecture for superior sound & easy Plug & Play installation. USB & analog inputs	Dual analogue inputs. Advanced servo Technology for deeper bass.	USB & analog Inputs. Deep powerfull bass, brilliant highs. Headphone output jack.	Deep bass. Subwoofer and headphone output jacks. Dual stereo inputs.	Incredible audio depth, auto on/off Chest-thumping bass response down to 35Hz.
White:	(81339)	(86029)	(86031)	(99555)	(81345)	(81348)	(81350)
Black:	(81340)	(86030)	(86032)	(99556)	(81346)	(81349)	N/A
	GST Inc: \$79.⁰⁰	GST Inc: \$132.⁰⁰	GST Inc: \$171.⁷⁰	GST Inc: \$119.⁰⁰	GST Inc: \$257.⁰⁰	GST Inc: \$99.⁰⁰	GST Inc: \$168.³⁰

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Colour text - 3.2ppm
6pl MicroDot producing output

(A8092) GST INC
\$238.00



EPSON STYLUS COLOR 680

4 colour inkjet printer
2880x720 dpi
Black text - 8ppm
Colour text - 7.7ppm
4pl MicroDot producing output

(A8093) GST INC
\$329.00



EPSON STYLUS PHOTO 720

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1440x720 dpi
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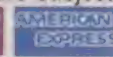
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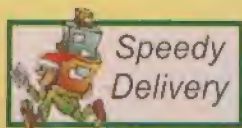
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Handheld Computers



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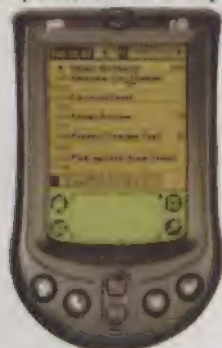


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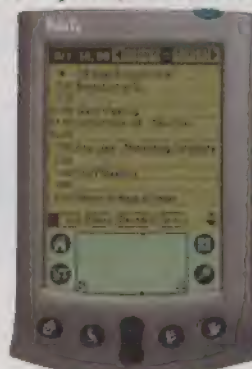
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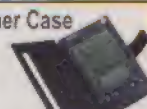


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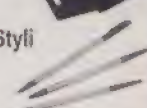
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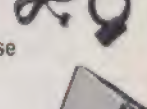
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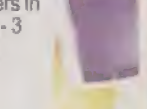
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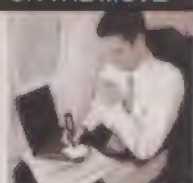
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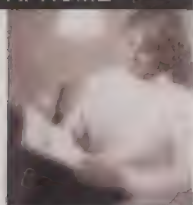
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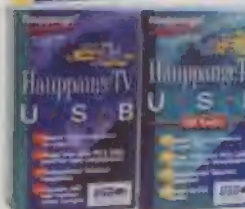
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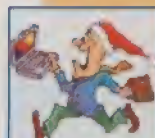
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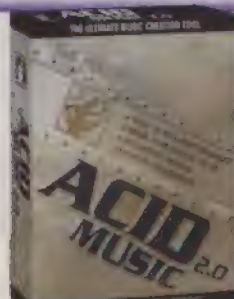
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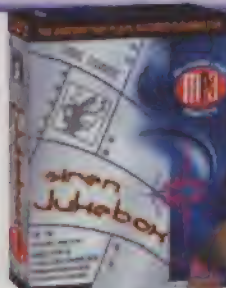
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- SmartCapture technology saves Hard disk space



(87677) GST INC
\$298.¹⁰

DC30 Plus

- The professional choice for Analogue Video Capture / Editing, with Composite & S-VHS IN/OUTPUTS
- Full Version Adobe Premier V5.1
- Full version Acid Audio editing software with on Board Audio, (avoid lip Sync issues)
- Blue Break out Box



(31696) GST INC

\$1,399.²⁰

Firewire CardBus PC Card

- Video Studio v4 Video Editing Software, MPeg-1 / MPEG-2 Editing
- Runs on Windows & Mac Platform



**Orange Micro
inc.**

(A1751) GST Inc

\$355.³⁰

Studio DC10 Plus

- Studio DC10 Plus is an affordable desktop video editing solution with the power, features and performance expected in higher end solutions. Captures and outputs full screen video at PAL or NTSC standard, includes the famed miro-INSTANT VIDEO to break the 2GB barrier for Windows. Comes with some great software to assist you with your editing!



(75800) GST INC

\$532.⁴⁰

DV200

- Full version of Adobe premier v5.1
- True digital / firewire capture card, for professionals
- Firewire cable & Miro Tools software to overcome 2 gig file size limitation
- 2 external firewire ports



(77104) GST INC

\$1,135.²⁰

Studio PCTV USB

- All the features of PCTV Pro
- Hot-Pluggable USB external device
- Take Still image using "Snap Shot" button



(85878) GST INC

\$319.⁰⁰



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107T 17" Real Flat Monitor

(A8899) GST Inc:

\$589^{rrp}



- (16.0"VIS) For use with MACs & PCs
- Autoscan covers horizontal frequencies up to 71 kHz offering a maximum resolution of 1280 x 1024 with flicker free display of 1024 x 768 at up to 89 Hz
- Real Flat High Contrast CRT with high-resolution 0.25 mm dot pitch (0.21 hdp)
- LightFrame™ for brightest & sharpest display of movie & photo windows
- XSD - Xtra Space Design™ for large screen display in a small footprint: maximum depth of only 419 mm / 16.5"
- MPRII, NUTEK, EPA, FCC, CE, ISO9241 and ISO14001 certified



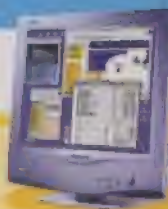
109S 19" CRT Monitor

(62616) GST Inc:

\$925.⁰⁰



- (18.0" VIS) For use with MACs & PCs
- Autoscan covers horizontal frequencies up to 92 KHz offering a maximum resolution of 1920 x 1440 with flicker free display of 1280 x 1024 up to 86Hz
- Flat Square High Contrast CRT with 0.27 mm dot pitch (0.23 mm hdp)
- Large screen display in a small footprint: World's shortest 19-inch conventional monitor with maximum depth of only 440 mm/17.3"
- TCO99, E2000, NUTEK, EPA, FCC, CE and ISO9241 certified.



140S 14" LCD Monitor

(A8900) GST Inc:

\$1,799^{rrp}

- Analog video interface with advanced one touch AUTO adjustment for full compatibility with standard video cards
- Most compact design 6.5"(165mm) depth with cable management, less than 60%foot print of comparable CRT monitors
- TCO99 Certified



150P Brilliance 15.1" LCD

(94489) GST Inc:

\$2,105.⁶¹

- 60% smaller footprint-only 165mm deep
- Dual input-Accepts both DVI Digital & VGA input
- Advanced AUTO adjustment automatically optimizes picture quality
- Built-in, front-firing stereo speakers & microphone for video conferencing & multimedia applications



170B 17" LCD Monitor

(A8901) GST Inc:

\$3,999^{rrp}

- Dual input- accepts both DVI Digital and VGA input
- Advanced AUTO adjustment automatically optimizes picture quality
- Wide viewing angle technology
- 7.1" (181 mm) small footprint with full detachable cables



181AS Brilliance 18" LCD

(A8902) GST Inc:

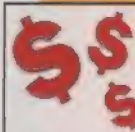
\$6,159^{rrp}

- Flicker-free screen
- 160° viewing angle. Flexible bezel configuration.
- Spill-proof Integrated tilt/swivel.
- Long-life 30,000-hour backlight.
- Multiple input capability (VGA & 5xBNC connectors included).
- Auto configuration & ability to expand any 4:3 image to fill the 5:4 screen.



Philips 3 Year Parts & Labour Warranty*

* Conditions apply



Pricing and specifications herein are subject to change without notice as at time of going to print not all pricing was available. Please see web direct link for latest info and pricing.

NEW Speaker Range



A1.2 Fun Power

(A8905) GST Inc:

\$29^{rrp}

ANALOGUE SPEAKER SYSTEM
2 x 1.5 watts (RMS) speakers for connection to a stereo sound card, CD/cassette/MP3 player, other audio visual sources. Bass Boost and Bass Reflex System. Magnetically Shielded.



A1.2 Fun Power Plus

(A8906) GST Inc:

\$49^{rrp}

ANALOGUE MULTI MEDIA SPEAKER SYSTEM
Active 10 Watts from two 5 watt desktop speakers for connection to a stereo sound card, CD/cassette/MP3 player, etc. Bass boost and Bass Reflex System. Magnetically shielded.



A2.3 Speakers

(A8907) GST Inc:

\$99^{rrp}

MULTI-MEDIA SPEAKER SYSTEM
Active High Power 32 Watts (RMS) 3 piece speaker system (2 x 6W speakers and 1x 20W subwoofer). High Quality sound, Compact Powerful Subwoofer, High Clarity Satellite speakers, Remote Control, Bass Boost, Magnetically shielded.

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LaserJet and InkJet Printers

Ask us about the new HP 2 Year Warranty on all HP Laser Jet Printers



HP Business Inkjet 2200

The HP Business Inkjet 2200 has a higher print speed (normal mode) than any other HP inkjet. And, like the other two printers in the range, it's extremely cost effective.

- 15ppm black printing, 14ppm colour printing
- HP PhotoREtIII
- HPA™ installed
- 250-sheet input tray
- 8MB of memory
- One 96MHz Motorola processor on board



(A3361) GST INC

\$1035.10

HP Business Inkjet 2250/2250TN

The HP Business Inkjets 2250 and 2250TN come with all the features of the 2200, and also include:

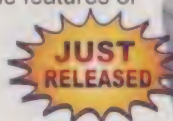
- HP PCL5Ce, HP PostScript level 2 emulation
- 24MB RAM upgradeable to 88MB
- Two 96MHz Motorola processors on board
- HP JetDirect 600N internal print server (2250TN only)
- Additional 250-sheet input tray (2250TN only)

2250 (A3362) GST INC

\$1447.60

2250TN (A3363) GST INC

\$2069.10



HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the LJ 1100 into an all-in-one performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm. 2MB RAM.

(70095) GST INC

\$705.10

HP LaserJet 1100A Printer-Copier-Scanner

If your business needs require copying & scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button. Scan resolution 600dpi enhanced, 300dpi optical.

(70096) GST INC

\$956.81



HP LaserJet 2100 Series

All models feature:

- 1200dpi resolution
- 10ppm print speed
- 60MHz processor
- 350-sheet capacity
- 15,000 page monthly duty cycle
- Excellent performance

LaserJet 2100

A fast flexible laser with room to grow. EIO, PCL 6, 4MB RAM.

(72291)

GST INC

\$1,226.50

LaserJet 2100M

A fast flexible laser with PS and PCL. EIO, PCL 6, 8MB RAM.

(72292)

GST INC

\$1,447.60

LaserJet 2100TN

A complete network printer. EIO, PCL 6, 8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed.

(72293)

GST INC

\$1,629.00



HP LaserJet 4050 Series

All models feature:

- 1200dpi resolution
- 16ppm print speed
- 133MHz processor
- 500-sheet capacity

LaserJet 4050

PCL 6, 8MB RAM.

(77443)

GST INC

\$1,973.40

LaserJet 4050N

PCL 6, 16MB RAM.

(77445)

GST INC

\$2,459.60

LaserJet 4050TN

PCL 6, 16MB RAM

(77446)

GST INC

\$2,950.00



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A4 BJC-3000



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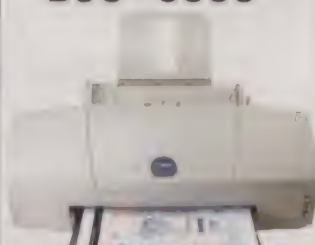
\$244.00

• Up to 9ppm print
speed black

• 1440 dpi

• Separate
replacement colours

A3/A4 BJC-6500



(95962) GST INC

\$619.00

LBP1000

10 pages per minute print engine at 1200 dpi resolution. Energy saving 'On-Demand' toner fusing. Cost-saving 'economy' printing mode. Powerful processor to ensure maximum throughput. Memory Saving

Technology to accomplish more in less RAM. PCL6 Print Language emulation. Optional genuine Adobe® PostScript® 3™ printer language. Optional second 250 sheet paper feeder. Maintenance free 'all-in-one' toner and drum cartridge. 4 MB RAM standard - upgradeable to 36 MB.



(95983) GST INC **\$1,158.30**

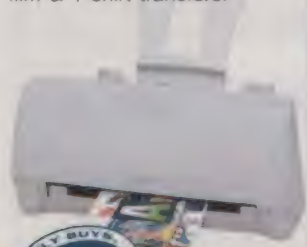
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BJC-1000SP

Super Economy Mode in black & white & colour. Vivid colours, on plain paper. Photo Mode colour, optional PhotoRealism. Auto image improvement. Print banners up to 6 A4 pages, envelopes, transparencies, glossy photo paper, high gloss film & T-shirt transfers.

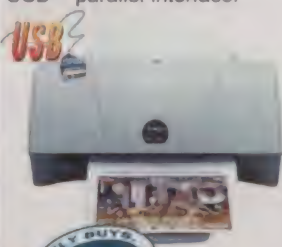


(A1792) GST INC

\$129.00

BJC-2100SP

High performance at a low price - the ultimate printer! Ultra compact design. Up to 5ppm in monochrome. Up to 2ppm in colour. 4-colour photo printing. Optional colour image scanning. Range of driver features. Banner printing. USB + parallel interface.



(A3173) GST INC

\$176.00

BJC-6200

Compact design and uncompromised performance! Up to 10ppm in monochrome. Up to 7ppm in colour. 1440 x 720 dpi. 6-colour photo printing. Sharper, blacker text. Optional colour image scanning. Separate colour ink cartridges! USB + parallel interface.



(A3507) GST INC

\$357.50

LBP800

Desktop laser, 8ppm, 300x300dpi, 600x600dpi and 2,400dpi with text and line smoothing. 512K buffer. 2,500 pages per cartridge (5% cover). Win® 95, 98 and NT 4.0.



(83787) GST INC

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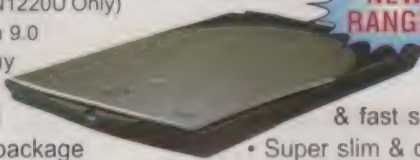
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N650U

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N1220U

1200x2400dpi.
(A3523) GST INC

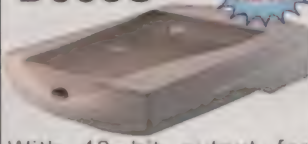
\$268.40

FB-1210U

1200x2400dpi
(A3524) GST INC

\$447.70

D660U



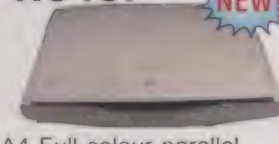
With 42 bit output for Windows 98, 2000 and USB Mac Systems. Fast one pass USB scanning. 600x1200dpi film scanning via film adaptor built-in to scanner lid.

D660U

1200x2400dpi
(A8903) GST INC

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N640P



A4 Full colour parallel flatbed scanner. Fast one pass scanning. Unique LIDE contact image sensor technology. 600x1200dpi. Incredibly thin (39mm). compact stylish design.

N640P

1200x2400dpi
(A8904) GST INC

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N340P

300x600dpi
(A8919) GST INC

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Stunning Performance...

With Unbelievably Low Running Costs

The Tektronix Phaser 850 is nothing less than an exceptional, network-ready, powerhouse colour printer from Fuji Xerox. It's in a class of its own. If you buy now you will also receive a lifetime supply of free black ink with no conditions. Giving you lower costs per print.



BREAKTHROUGH SPEEDS

- Up to 14 colour pages per minute.

UNBEATABLE POWER

- 200MHz processor.

DAZZLING COLOUR AND IMAGE QUALITY

- Prints the same colour & image quality on plain paper as specialty stocks.

FREE BLACK INK

- Order as much as you like without having to order any colour ink.

ON-BOARD NETWORKING

- 10/100BaseT Ethernet or native USB.

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Phaser 850
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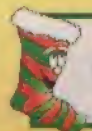
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Model	Tektronix	850/N	850/DP	850/DX
Resolution		800 dpi	1200 dpi	1200 dpi
Memory Standard/Max		32 MB (256 MB)	64 MB (256 MB)	128 MB (256 MB)
Built-in Hard Disk		Optional	Optional	6 GB Hard Disk
RISC PowerPC Image Processor		200 MHz	200 MHz	200 MHz
Max. Speed Fast Colour or Mono		14 ppm	14 ppm	14 ppm
Max. Speed Standard Colour or Mono		8 ppm	8 ppm	8 ppm
Max. Speed Enhanced Colour or Mono		4 ppm	4 ppm	4 ppm
Max. Speed High Resolution/Photo		2 ppm	2 ppm	2 ppm
Pipeline Printing		Optional	Standard	Standard
Job Accounting		50 Jobs	500 Jobs	5,000 Jobs
Collation Printing		Optional	Yes	Yes
Duplex Built-in Automatic		Optional	Standard	Standard
Main Paper Tray 200-sheet		Standard	Standard	Standard
Hi-capacity Tray 500-sheet each (two)		Optional	Standard (one)	Standard (one)
Part number		(90162)	(90163)	(90164)
RENT*		\$48.85	\$60.37	\$76.81
GST Inc		\$5,359.²⁰	\$6,958.⁶⁰	\$8,995.⁸⁰



Tools for the "E" Generation

SnapScan e20

600x1200 optical resolution (9600 maximum), 36bit, USB interface, Mac & Win98/Win2000Me compatible. Includes 3 interchangeable coloured handles, Software package includes Agfa ScanWise, Readiris and Corel PrintOffice 2000

(xxxxx) GST Inc:



\$Call

SnapScan e40

1200x2400 optical resolution (9600 maximum), 42bit, USB interface, 3 interchangeable coloured handles. Agfa bundles Corel Print Office 2000 and Readiris. Corel Print Office makes it easy to create impressive documents and Web pages. Readiris, which recognizes 55 languages, lets users easily convert hard-copy documents — originals, faxes and photocopies—into editable text. All software provided is available in 5 languages, for both Windows (including Windows 2000) and Macintosh platforms.

(A5009) GST Inc: **\$378.40**

SnapScan e50

1200 x 2400 optical resolution (9600 maximum), 42 Bit, USB interface, Integrated TPO for transparency and negative scanning, 4 front panel buttons (programmable), 3 interchangeable coloured handles and button covers. Agfa ScanWise and comprehensive software package including Corel Print Office 2000 & Readiris.

(99759) GST Inc: **\$429.00**

SnapScan Touch

Agfa's revolutionary SnapScan Touch USB Scanner has four programmable buttons: scan direct to file, email, fax or printer. 600x1200 ppi, 36 bit, landscape desktop scanner. Comes with 7 translucent coloured handles! Software: Agfa ScanWise, Caere OmniPage LE, Caere PageKeeper (PC only) Micro Frontier Color IT! (Mac only) and Corel Print House

(87209) GST Inc: **\$228.80**

ePhoto CL18

Dual Mode: (point-and-shoot digital camera with video conferencing, video clipping and video e-mailing features), VGA (640 x 480 pixels) optical resolution with CMOS sensor, 32 images on internal 2Mb memory (non removable), Optical viewfinder, Built-in Flash, ISO 200, Includes camera cradle for video conferencing, USB interface. Excellent s/w bundle (Twain driver, Corel PrintHouse, Corel PhotoHouse, Microsoft NetMeeting, ArcSoft VideoImpression)

(99757) GST Inc: **\$329.00**

ePhoto CL20

1280 x 960 max resolution (with PhotoGenie). Dual Mode: still image and live action. Stores 10-30 images on 1MB internal memory. CompactFlash slot for optional storage on CompactFlash cards (card not included). Built in flash. Extensive software package includes: Agfa Twain Driver, AgfaCam Mounter, Agfa PhotoWise 3.0, ArcSoft Video Impression, MicroSoft NetMeeting, AGFAnet client software, Acrobat Reader

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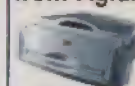
NEW!!

ePhoto CL30Clik!

The fantastic ePhoto CL30 now available with built-in Iomega Clik! Drive. Mega-pixel digital camera with USB interface and a resolution of 1440x1080 pixels. Features an optical viewfinder and 1.8" colour LCD screen. Auto focus lens with 2x digital zoom and macro function.

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from Agfa...



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HP ScanJet 3400C

Easy scanning, copying
and e-mail!

- WYSWYG compatability
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- 36 bit colour
- Precision Scan LTX software



(A2285) GST INC

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from a brand you can trust

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- Windows 2000 support
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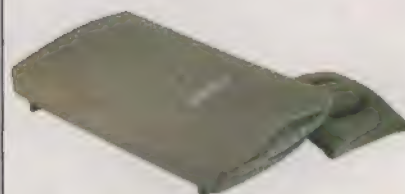
(A2286) GST INC

\$374.00

HP ScanJet 5370C

Multiformat - Scan/copy/
e-mail and fax

- 1200 dpi optical resolution
- 42 bit colour
- Active XPA included
- Negatives support
- Dual I/O: USB & Parallel
- Active transparency adapter
- Mac drivers
- Precision Scan Pro 2.5



(A2287) GST INC

\$564.30

HP DeskJets

HP DeskJet 640C

HP's easy, everyday colour
inkjet printer

- Black and colour cartridges included - everything you need!
- Great results on plain paper
- Special projects made simple - greeting cards, envelopes & more
- Prints up to 6 ppm black and 3 ppm colour



(A2288) GST INC

\$169.00

HP DeskJet 840C

HP's creative photo-quality
colour, speed and flexibility

- Photo-quality with HP PhotoREt II
- Alternative 600x1200 dpi mode on photo paper
- Prints up to 8 ppm black and 5 ppm colour
- Exclusive HP inks dry fast for smudge-resistant text and images



(A2289) GST INC

\$285.00

HP DeskJet 930C

Compact Photo-Quality
Colour InkJet Printer

- Alternative 2400x1200dpi mode on photo paper with HP PhotoREt 3
- Excellent results on all types of media in all modes
- Prints up to 9ppm black and 7.5ppm colour



(95761) GST INC

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(84904)

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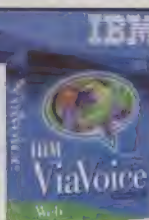
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(87935) GST Inc: **\$597.00**

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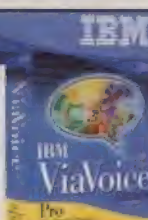
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(90468) GST Inc: **\$148.00**

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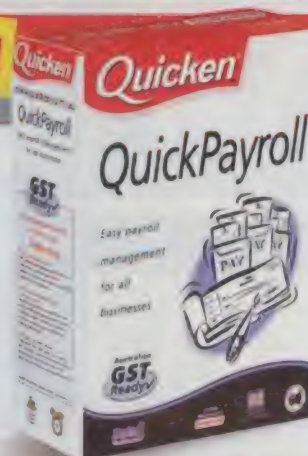
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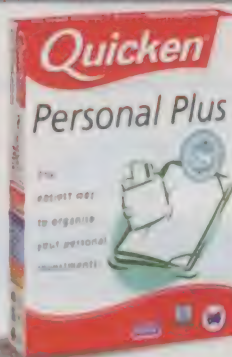
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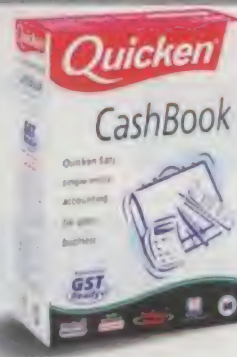
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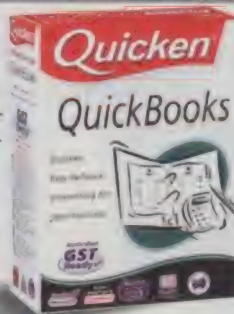
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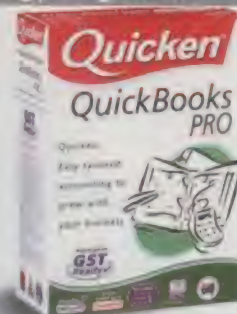
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(A5736)

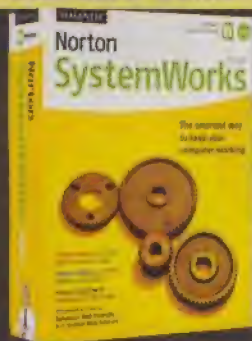
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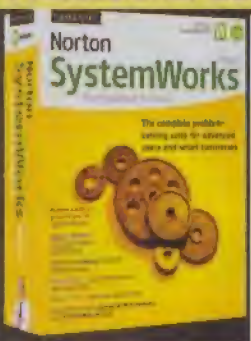
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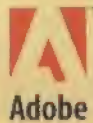
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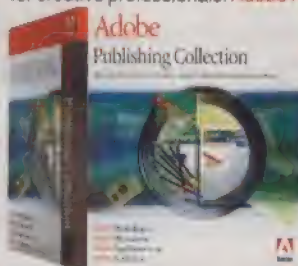
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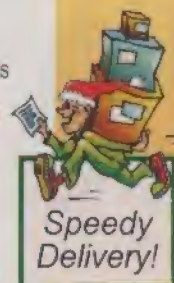
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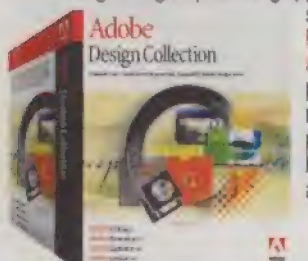
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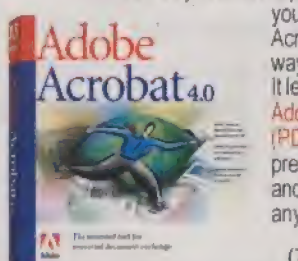


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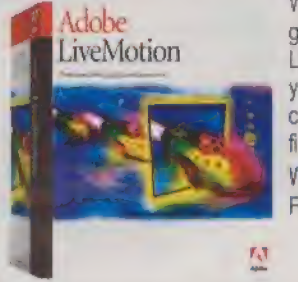
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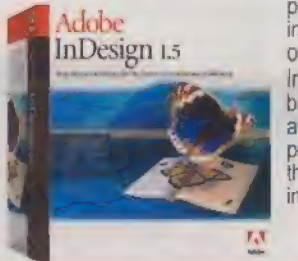


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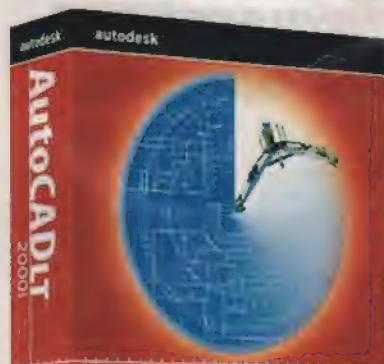
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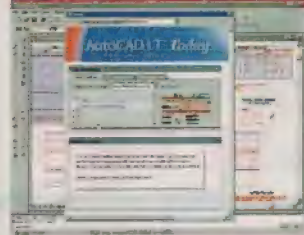
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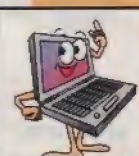


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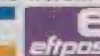
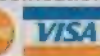
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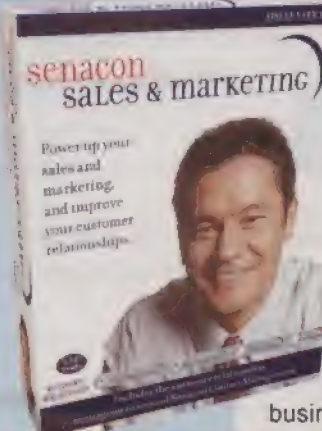
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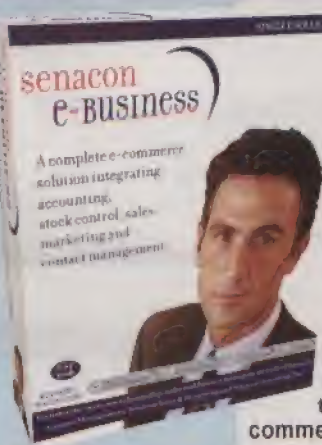
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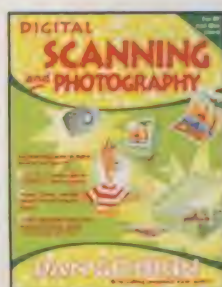
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Windows Me Do-it-Yourself

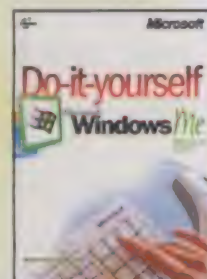
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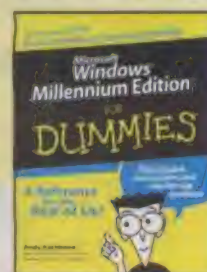
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This handy guide is the ultimate A-to-Z reference to PC Health, Auto Update, Internet Connection Sharing, Internet Explorer 5.5, online gaming, and all the other cool features of Windows Millennium Edition. Perfect for the beginner or the pro, this easy-to-follow format puts answers at users' fingertips as they work with Windows.



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Extensive input from the Windows Millennium Edition development team, rigorous testing of the content, and depth of feature coverage make this the quickest way to learn Windows Millennium Edition.

Microsoft Windows Millennium Edition, the newest version of the Microsoft Windows operating system for home PCs, offers the richest Internet and entertainment experience by simplifying the use of key PC features that consumers work and play with every day. Using Millennium, you can easily find, manipulate, and share music and pictures, play computer games, get your whole family on the Internet quickly, use intelligent PC appliances that are faster and more accessible, and quickly network and use multiple PCs at home. MICROSOFT WINDOWS MILLENNIUM EDITION STEP BY STEP is the easiest and fastest way to teach yourself what you need to learn about Millennium Edition at your own pace. Easy-to-follow, step-by-step lessons include clear objectives and real-world business examples to make learning even complex tasks interesting. You get easy visual navigation, help in finding the best starting point so you get the most out of the book, and lay-flat binding so it's easy to read when open. A companion CD provides practice files and movie-style demos to simplify learning.

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Microsoft Windows Me DO-IT-YOURSELF

The author's close relationship with the software development team, rigorous testing of the content, and depth of coverage make this the definitive resource for insider tips and tricks about Windows Millennium Edition.

Microsoft Windows Millennium Edition, the newest version of the Microsoft Windows operating system for home PCs, offers the richest Internet and entertainment experience by simplifying the use of key PC features that people work and play with every day. DO IT YOURSELF MICROSOFT WINDOWS MILLENNIUM EDITION is the quick, easy way to find what you need to know so you can get on with what you're doing with Windows Millennium Edition. Written in a light, friendly voice, this book showcases the many cool new add-ons in Windows Millennium Edition, such as the Pictures Acquisitions Wizard, which makes it easier to work with photos from your digital camera or scanner; a simple utility for networking multiple PCs and peripherals such as your printer; direct voice play so you can talk to other players during head-to-head combat over the Internet; plus many other Internet, video, and audio features. The book features straightforward step-by-step procedures and tips and tricks to help you get the most out of Windows Millennium Edition right away. The author's close working relationship with the Windows Millennium Edition software product team lets him deliver the latest insider insights about Windows Millennium Edition, making this the definitive condensed resource for information about the new operating system.



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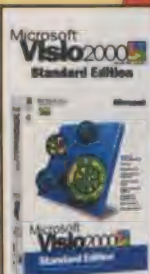
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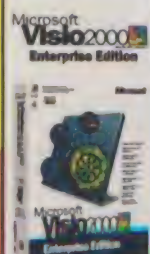
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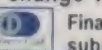
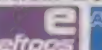
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I spy with my little eye

Deus Ex

Those fascinated by Big Brother will be quite taken with Deus Ex. A role-playing adventure game, Deus Ex could easily double as a conspiracy theory compendium.

The game casts players in a not-too-distant future where civil unrest grows daily and the gap between 'us' and 'them' is wider than ever. This is a world where multinationals rule, governments are

powerless, and technology is used against people more than for them.

You play the role of JC Denton, the United Nations Anti-Terrorist Coalition's (UNATCO's) latest weapon to curb rising threats to the interests of the international conglomerates. A recently graduated agent, you are also a guinea pig for the new nano-augmentation project, where cybernetic enhancements heighten your senses and physical prowess.

You begin the adventure having been told to infiltrate the makeshift base of a terrorist organisation just outside UNATCO headquarters. Completely oblivious to the politics of the situation, you follow your orders to the letter, as any good agent would. However, it's not long before you become suspicious of those you once trusted and must find your own role to play in the rather spectacular events.

Divided into discrete missions with multiple objectives that can be changed or supplemented, Deus Ex's play style is reminiscent of last year's highly regarded System Shock 2. Players have a high level of control over character development and world interaction.

Most items you come across are usable in some way. You can enhance weapons, hack into computer networks, take part in a bit of ecommerce, dive for sunken treasure, break into restricted premises, and engage other characters. While some of these actions are just to help immerse you in the game world, many provide substantial benefits for completing mission objectives (as well as kitting out your character with the latest and greatest that money can buy).

Given its first-person perspective, it is tempting to approach Deus Ex like a typical action shooter. After all, it uses a highly modified version of the Unreal Tournament game engine. Indeed, players can adopt a style of play where they romp through

*Infiltrate a terrorist organisation,
but all is not as it seems.*



missions at a frenetic pace, laying waste to all and sundry with an arsenal of terrific weapons. However, this probably won't help them complete their mission objectives. Hostile forces display cunning combat skills, have deadly aim, will raise the alarm once you've been spotted, and flee when wounded. They are also armed to the teeth.

However, you do have options. Instead of going for a frontal assault, why not try a more subtle approach? Sneak in the back way, or divert attention away from your point of entry and simply walk through the front gate. How about locating the enemy's security network and turning their own defences against them?

If you have a strong conscience, how about trying to play the game keeping the number of fatalities to a bare minimum? Extreme force might not be necessary. Diplomacy can be just as powerful. Deus Ex is about choice, and you have plenty of freedom to make those choices.

What holds Deus Ex together, and ultimately elevates this exceptional adventure, is the highly detailed world in which Ion Storm places you. The illusion is impressive. Deus Ex is more a virtual world than a game environment, and there are constant reminders of the choices that you've made throughout. Truly engaging stuff!

March Stepnik

Contact OziSoft

Phone (02) 8303 6800

Online www.deusex.com

Price \$94.95

Requires Pentium II 300, Windows 95, 64M RAM

Classification MA(15+)

Rating ■■■■■■■■



Grand Prix 3



Five years is a long time in the computer industry, but that's almost how long PC Formula One enthusiasts have been waiting for their next big game. Since 1996, Geoff Crammond's Grand Prix 2 has been the benchmark for all racing games, and now Grand Prix 3 has arrived to raise the standard once more.

For those unfamiliar with Crammond's work, his games brim with almost excessive detail. Every aspect of racing a Formula One car is covered, from changing minute details in the car's setup, to picking the perfect line out of that hairpin turn. Nothing has been forgotten, and Grand Prix 3 truly is the masterpiece we have all been waiting for.

Despite its overall complexity, Grand Prix 3 allows even novice drivers to start racing immediately. This is done through a series of driving aids, which range from steering, acceleration and braking help, to automatic gear changes and indestructibility. These aids are useful at first just to keep you on the track, but you should be racing competitively in no time.

Don't even contemplate trying to control Grand Prix 3 with a keyboard. Use a joystick if that's all you have, but it really

is worth investing in a steering wheel to ensure you get the full experience.

All of the Formula One circuits from around the world have been included, ranging from the flowing turns of our very own Albert Park, to the notorious winding chicanes and hairpins of Monaco. All of the real drivers and teams are also present, albeit in their 1998 form. The use of data from two years ago is unfortunate, as the composition of a number of teams has now changed, and some new teams have also emerged. The Grand Prix 3 community has already created patches to include season 2000 information.

Continuing the Grand Prix series tradition, the graphics are cutting edge. With Grand Prix 3 fully utilising 3D hardware support, Formula One racing has never looked so good. Each car is incredibly detailed — from correct markings to the way the driver's head moves as he takes a sharp corner. The tracks also look magnificent, and the realistic backgrounds make you feel as if you're really there. However, it is the addition of dynamic weather which provides the most impressive visuals. The rain pouring down and the spray splashing into your face from the car in front, have to be seen to be believed.

Such graphic detail comes at a cost. Unless you have a fast processor and 3D accelerator, you won't be enjoying Grand Prix 3 in all its glory.

However, the Grand Prix games have never just been about great graphics, or easy-to-use driving aids. These games have built an enormous fan base because of their incredible realism, and Grand Prix 3 is no exception.

Driving at full realism with no driving aids can turn a simple practice lap into a costly nightmare, while taking pole position seems to be impossible. This is the beauty of Grand Prix 3. No other game gives you the rush of screaming down the main straight at an almost out-of-control 320kmph. Nor does any other game give you quite the same satisfaction when you finish well against opponents of greater strength.

Even more satisfaction can be had from changing the setup of

your car in the garage. By changing the slightest thing, such as down force, ride height or tyre settings, you can cut seconds off your lap time — or see you familiarise yourself with the wall.

With such infinite customising possibilities and a range of difficulty settings, Grand Prix 3 has greater longevity than most games. Take into account the enormous fan base which continually updates almost every aspect of the game and you can see why people will be playing this game for years to come.

Upgrade your computer, buy yourself a decent steering wheel, and start driving!

Alan Crawford



Contact Hasbro

Phone (02) 9966 9899

Online www.grandprixgames.com

Price \$89.95

Requires Pentium II 266, Windows 95, 32M RAM

Classification G

Rating ■■■■■■■■

Gamespy

● Some sad news for X-Com fans: the much anticipated X-Com Alliance was expected to be ready by now, but word is that the game won't be finished until next year. Hasbro, which owns developer Microprose, has a strict 'no comment' policy about its forthcoming games. This doesn't really help, but it's safe to assume that the ambitious feature set for the game is behind the delay.



● It seems like almost every second game released lately is a Star Trek game, and Activision and Interplay are pumping them out like never before. Interplay's latest, developed by a UK development house called 14 Degrees East, has just gone gold. This latest release takes a slightly different tack to the other Trek games out there. Star Trek: New Worlds is a ground-based real time strategy (RTS) game, pitting the Romulans, Klingons and Federation against each other in what looks like an interesting blend of role-playing and conventional RTS.

● Red Storm Entertainment hasn't been around all that long, but it has already established a name for itself as a quality developer with big titles like Rainbow Six, Rogue Spear, Shadow Watch and Bang Gunship Elite already under its belt. Now the rumour mill is really beginning to kick into gear regarding a possible Ubi Soft buyout of the company. Ubi Soft representatives are predictably saying 'no comment', but don't be too surprised if things change in the near future.

● Eidos has announced that Ion Storm Austin will be developing Thief 3. Warren Spector, who worked on the original Thief, has been named as the project leader and there are a few ex-staffers from the original Thief development house, Looking Glass Studios, onboard at Ion Storm now too. Good news!

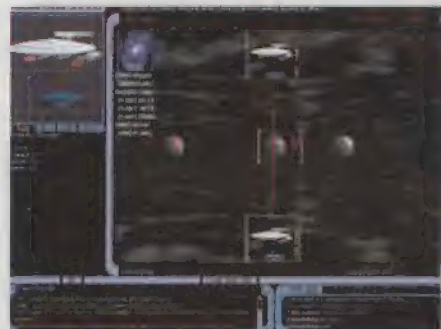
● Ever fancied yourself as a game designer and/or developer? Brisbane-based games

Star Trek: ConQuest Online

What happens when you combine Trekkies with trading card games like Pokemon and Magic: The Gathering? That's right, it's PokeTrek: The Gathering, better known as Star Trek: ConQuest Online.

In your role as 'Q', an omnipotent character from *Star Trek*, you play a form of interstellar chess against other Qs using ships and characters from the *Star Trek* universe. It's designed for online play, but there is an offline AI mode which players can use to hone their skills before they take to the battlefield. You will need to use this mode, as there is a lot to learn, but online play can be an enjoyable battle of wits against a human opponent.

You play with a virtual deck of cards representing various tokens (ships, shields, diplomats, weapons), placing and moving



the tokens to outwit your opponent. With each purchase of ConQuest Online you receive five standard packs of cards. The really good cards are available only by separate purchase of booster packs from the game site, by trading with other players, or by purchasing from other players on ST, ConQuest's eBay-style trading site.

This is where the real substance of the game is. The game is simple, but it's amassing the best deck possible that is the most addictive part of ConQuest Online. Be warned: ConQuest Online is dangerous, both to your time and your bank balance.

The retail version comes with seven booster packs, but the full game is available for free download (and is on this month's cover CD). You need to pay \$US10 to register.

Gareth Jones

Contact Activision

Phone (02) 9869 0955

Online www.conquestonline.com

Price \$49.95

Requires Pentium 75, Windows 95, 8M RAM

Classification G(8+)

Rating ■■■■■■■■

Heavy Metal FAKK2

The long-anticipated Heavy Metal FAKK2 has arrived, and its mix of beautiful graphics, varied artillery and an impressive heroine should give a much-needed boost to the 3D action/adventure genre.

You play the role of Julie, who (in a highly original plot) needs to save her planet from an alien invasion. The game uses the powerful Quake III graphics engine, so saving the world has never looked so good. The game is mainly set in magnificent outdoor environments, and to its credit, runs reasonably well on slower machines.

Julie provides the most striking graphics and she can perform an impressive array of movements. Add to this her changing attire, and you have an interesting character



However, her combat skills are what draw the most attention, and she has plenty of them. The usual array of guns and magical effects are present, and numerous close-combat weapons such as swords and slingshots are a welcome addition. The intuitive combat system uses a different button to control each hand, and this allows for some interesting combinations. The enemies can become repetitive, but the fact that they are based on the Heavy Metal universe will please many gamers.

Heavy Metal FAKK2 is by no means a revolutionary game, but it is great fun to play and its graphics are amazing.

Alan Crawford

Contact Jack of All Games

Phone (02) 9482 3455

Online www.ritual.com/FAKK2

Price \$79.95

Requires Pentium II 233, Windows 95, 64M RAM

Classification M(15+)

Rating ■■■■■■■■

KISS Psycho Circus: The Nightmare Child

Here's the scenario: imagine jumping into the shoes of your favourite KISS band member, strapping on some large weapons, and blasting away to your heart's content. This is the gist of the game: it's a straightforward fragfest, where the emphasis is on pumping rounds into as many enemies as possible.

The game's story-line is based on the KISS Psycho Circus comic book series created by Todd McFarlane, who is more widely known as the creator of Spawn. The game is in four parts and each part is identifiable by 'Elder being' characters, Star-bearer, Demon, Celestial, and the Beast King. The game uses a modified version of Monolith's Lithtech engine, which was also used for Shogo and Blood 2. As the game



progresses the player does too, first emerging as a mere mortal and developing into a creature with unique powers.

The four characters, different scenarios, puzzles and landscapes will definitely keep gamers coming back for more. You have to assemble all five band members' costumes to give them the power to defeat the Nightmare Child. Each element of the glam-rock costumes is functional as well as flashy; for example, platform boots increase your jumping ability and a breastplate increases your health.

This is a very effective game, and it has great characters and level design. The only disappointment is the music; you'd think that it would contain several of their big hits, but alas, no.

Ryan Shaw

Contact Jack of All Games
Phone (02) 9482 3455
Online www.godgames.com
Price \$69.95
Requires Pentium 266, Windows 95,
64M RAM
Classification M(15+)
Rating ■■■■■■■■■■

Traffic Giant

If you've ever wondered why buses travel in packs of three, or wanted to blame someone because your train seems to have vanished, then Traffic Giant might just be for you — as long as you have lots of patience.

Like many micromanagement sims, Traffic Giant presents much the same challenges as every other Sim City clone: manage your business (in this case, public transport) and finances, and above all, keep the punters happy.

Traffic Giant looks pleasant enough, and the cities you work in are represented in acceptable detail. There are theme parks, sporting venues and factories for your citizens to be transported to and from. It looks nice, but the controls



are initially baffling, and compared to other simulation games, it lacks overall advice. There's also no tutorial facility, which is an important omission.

The other problem with Traffic Giant is that it has less to control and alter than other games. The population never really increases and short of demolishing most of the city to build rail lines, you can't really affect the evolution of your city. It's this feeling of control that distinguishes the better simulations and it's where Traffic Giant is somewhat lacking. As a result, it's only an average game, even though it's based on a good idea.

Alex Kidman

Contact OziSoft
Phone (02) 9317 0000
Price \$79.95
Online www.trafficgiant.com
Requires Pentium 233, Windows 95
32M RAM
Classification G
Rating ■■■■■■■■■■

and software developer Auran (Dark Reign) is working on a product that garage game developers the world over are becoming justifiably excited about. Dubbed 'Auran Jet', the software functions as a "3D game development application", and best of all, it's free. Auran Jet is not designed to become a complete development package, but it will be the foundation for development and will help garage developers cut down on some of the grunt work required to develop a game. Though only in beta at this stage, you can take a look at what's on offer at www.auranjet.com.

● And another one bites the dust. Wombat Games, a startup development house formed by former members of the Ultima Online team, has folded after two years. Wombat had been working on a massive multiplayer online RPG called Dark Zion, but it wasn't able to secure a publishing deal and ran out of funding.



● Australian developer Ratbag Games released its cut-price racing sim Dirt Track Racing (DTR) over a year ago in the US and UK, but it still hasn't shown up on Australian shelves. The latest news is that DTR is slated for release some time in the next couple of months. Apparently, the reason for the delay is that Ratbag has been customising the game for Australia by including Kingswoods, Toranas, Monaros and Commodores, as well as Australian tracks to race on.



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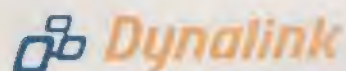
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For love of the game



Ever since the first Atari, consoles have brought the arcade gaming experience into your home. With features such as Net access and DVD movie playback, the latest generation of consoles leave the arcade behind. APC tests the new contenders and looks to the future of consoles.

Way back when Pong (played on paddles connected to the black and white TV) was all the rage, and the home computer was just beginning to take off, a strange combination of the two emerged: the gaming console. Then came the Colecovision, Intellivision and Atari 2600. These broadened the scope and appeal of consoles greatly. The graphics were terrible, the sound was even worse and the gameplay was appalling, but millions around the world were hooked. Consoles were like having arcade games in your home, with the added bonus of saving 20 cents per game.

Early home PCs like the Vic20 and the Apple II were mainly used for gaming, even though you could use them to program in Basic. The console market became dormant in the mid-'80s. This was partly due to the release of systems such as the Commodore 64, and partly to some appalling marketing decisions from Atari, including E.T.: The Videogame.

For a while it looked like the console was dead, but then Nintendo launched the

Nintendo Entertainment System (NES) and it revitalised the industry. The 16-bit console war was fought between Nintendo and Sega, and each company attracted a similar number of followers.

Processing power, memory and graphics capabilities had greatly improved by the early to mid-'90s, and this gave rise to the 32-bit versus 64-bit console war. Consoles such as the Sega Saturn, Sony PlayStation, Nintendo 64, Atari Jaguar and the 3DO jostled for supremacy. The Sega Saturn fell by the wayside, as did the 3DO console and the Atari Jaguar, but the 32-bit Sony PlayStation and 64-bit Nintendo 64 succeeded.

It wasn't just processing speed that determined the success of a console. Savvy marketing and the signing of key developers were crucial. There are hundreds of games available for these systems, but the systems are getting old and will be replaced soon.

The latest and greatest

Sega released the latest version of its console, the Dreamcast, earlier this year, and

if everything goes to plan, you should also be able to purchase a Sony PlayStation2 in Australia by the end of the year. Both of these consoles have been in the pipeline for years. They were released in Japan months before their release in the US and Australian release has been a much lower priority.

When the plans for PlayStation2 were announced, Nintendo stepped up to the plate and revealed that it too had a next-generation console in the works, although no details were provided. The first official details about the Gamecube and its configuration have been made only in the last 6 months.

Microsoft and Indrema have also announced plans to release consoles in the near future. Indrema hopes to have its Linux-based L600 console shipping in the US by the end of this year, and Microsoft's Xbox will ship by the end of 2001. The Xbox and L600 will be launched in the US first, so if Indrema do beat Microsoft to the punch, there could be some fierce competition.

Sega Dreamcast



The Dreamcast is seen by many as Sega's last chance to grab a significant market share after the disastrous failure of its previous console, the now-defunct Saturn.

It uses a 200MHz RISC processor. Its PowerVR chip produces graphics that are clean, sharp and superior to anything that's come before it in a console. It even compares well with the upcoming PlayStation2.

The Dreamcast is CD-based, although it uses a proprietary encoding setup (which Sega refers to as GD-ROM) to dump just under 1G of data onto a single disc.

The console launched with a large number of titles, but since then, releases have been rather slow. Many titles that are available overseas are still not available locally. Chu Chu Rockets, for example, is the first of its kind. It's a massive online console game which was touted for release in May 2000, but it's still nowhere to be seen. The same goes for the epic RPG Shenmue and the odd fish-talking game Seaman.

The Dreamcast has a wide range of add-on hardware, from the mini Gameboy-like memory packs to fishing reels, vibration packs and a keyboard for online access. Locally, ISP access is handled by Telstra BigPond. There are also add-on Zip and hard drives. Cameras and networking links are planned.

Internationally, Sega's done quite well with the Dreamcast. In its first weekend on sale in the US, it took in more revenue from console sales than George Lucas did with *The Phantom Menace*. However, things aren't so rosy locally. A delayed launch, the further delay of its Internet service and competition with consoles selling for a quarter of its launch price have hurt the Dreamcast's sales, possibly fatally.

Sega recently dropped the price to a more wallet-friendly \$299. Undoubtedly, this is a pre-emptive strike to combat the anticipated hype for Sony's PlayStation2. Sony's technically inferior PlayStation system outsold the Nintendo 64, so perhaps

Sega can manage the same thing. It'll need to get its skates on to do so.

Pros Fast
Good graphics
Internet access

Cons Not many game titles available yet

Contact OziSoft
Phone 1800 060 605
Online www.dreamcast.com.au
Price \$299

Sony PlayStation2



Sony released the PlayStation in Australia in 1995 in direct competition with Sega's Saturn and, later, the Nintendo 64. It out-sold both.

Sony is now launching the PlayStation2, a console that is far ahead of its predecessor. There are many differences between the PlayStation and the PlayStation2, and the most obvious ones make the PlayStation2 much more than a standard console.

One major difference is the addition of a DVD drive, for DVD and CD games, DVD movies and audio CDs. The PlayStation 2 also features USB and i.Link connections borrowed from PCs. It still supports only two controllers.

The PlayStation2 uses the new 300MHz, 128-bit 'Emotion Engine' processor. This is far superior to the PlayStation's 32-bit processor which ran at 33MHz, and is three times faster than the Nintendo 64 processor. It uses the PlayStation processor as an I/O controller, enabling compatibility with most PlayStation games. The

upcoming Gamecube lacks this kind of compatibility.

Game load times for the PlayStation2 are comparable to those of the PlayStation (a source of disappointment for many), and the types of games available are very much the same. It differentiates itself with its underlying technology. The graphics and sound are far superior to those of the PlayStation.

The PlayStation2 also looks different to other consoles. It resembles a hi-fi component.

Pros Fast graphics
Only console available with DVD movie playback support
Lots of expansion

Cons High price, well over twice that of other consoles

Contact Sony
Phone 1300 137 669
Online www.playstation.com.au
Price \$749

Nintendo 64

Prior to Sony's successful launch of the PlayStation, Nintendo had the biggest share of worldwide console sales. Sega was a challenger, but Nintendo sold significantly more of its Entertainment System (NES) and Super NES units.

Nintendo entered the market with high-quality units that were state of the art at the time. However, the Nintendo 64 was a mixed bag. Nintendo stuck to its cartridge philosophy, partly for reasons of durability (Nintendo has always seen the console market primarily as a children/young teen market), but mostly because writing to cartridge allows it to charge royalties.

The Nintendo 64 has suffered because of this decision. While there is some excellent software available for it, the software catalogue is still tiny compared to Sony's.

The Nintendo 64 uses a dedicated 64-bit RISC processor supplemented by a cut-down SGI graphics processor. This means that Nintendo 64 games usually look bet-

ter than their PlayStation counterparts. The two areas where Nintendo 64 doesn't compete well are game size and memory. Cartridges load quickly, but their space is limited and the memory required for long-distance drawing and anti-aliasing makes long-distance perspectives and far away objects appear foggy.

When the Nintendo 64 launched, a lot of accessories were planned, but very few made it out of Japan. Besides Rumble, Memory and the Graphics expansion Pak, there's little available. A planned disk drive add-on, the 64DD was only launched in Japan, and even there it has disappeared without trace. More recently, Nintendo has capitalised on the Pokemon craze with a cartridge that allows data transfer between Gameboys and the Nintendo 64. More games are planned to take advantage of this feature.



Pros Better graphics than PlayStation
Cartridges make for quick game access
Cons Small game storage capacity

Contact Nintendo
Phone 1300 362 746
Online www.nintendo.com
Price \$199

The future of consoles — what's coming up

With the PlayStation2 soon to be available worldwide, there are only three major consoles in the works — Microsoft's Xbox, Indrema's L600 Entertainment System and Nintendo's Gamecube. Nintendo is sticking to its proprietary storage model, but the Xbox and L600 will use similar media.

Going on the current specifications (none of which have been finalised at the time of publication) both will have hard disk drives. These hard disks are for developers to use to speed up game performance (games will run primarily from the CD/DVD drives), to save games and for recording television like a VCR. Indrema has announced that this is one of the functions of the L600, but when APC went to press, the Xbox's TV features were still rumour. In the US, similar devices such as the Tivo and Replay TV, have not sold well, even though they can pause live movies and sports as you watch them.

All three new consoles will have DVD drives, but only the Xbox and L600 will support full DVD movie playback. The Gamecube will use 8cm DVDs and CDs



as its main media, which means that full-sized DVDs and CDs will not fit in the drive. Mini-DVDs can store up to 1.5G. This is much more than the 8M to 32M offered in the Nintendo 64's current cartridge, but is also a long way from the 4.7G available for games on the Xbox, L600 and PlayStation2.

The Xbox will use a 733MHz processor and 64M of RAM, the L600 will use a 600MHz processor and 64M, and the Gamecube a 405MHz processor and 24M 1T-SRAM and 16M DRAM (40M total).

Indrema hopes that the combination of the Linux craze and a low price for the L600 will ensure a large market share for the console. However, Microsoft has a huge amount of industry support and development, whereas Linux is not exactly gaming friendly. The Gamecube and the Xbox are expected to be released around the same time, so it will be interesting to see how they compete.

As the Napster trial continues, popular musicians are showing decidedly mixed reactions to the prospect of their work being swapped freely online.

Artists still mixed on free music

It's not often that an alternative band gets covered in mainstream media. However, Californian group The Offspring achieved that distinction in early September when they outlined plans to release an entire album online a month before it becomes available in shops.

The Offspring had planned to issue their new album, *Conspiracy of One*, as a series of free downloads, beginning on September 29. The record isn't due to hit the shops until November 14. The band would not have been the first to offer large chunks of its music online, but it's relatively uncommon for a musical act which is signed to one of the Big Five record labels — BMG, EMI, Sony, Universal and Warner — to take this path.

However, the plan was cancelled just two weeks after it was announced. Columbia, the Sony offshoot to which The Offspring are signed, was not happy with the idea. Instead of giving away the entire album, the band will only give away the album's first single. The switch isn't entirely surprising. Even The Offspring haven't wholeheartedly embraced music swapping. Until recently, the band sold caps bearing the Napster logo from their site, arguing that they should be entitled to generate revenue from Napster,

since Napster was generating revenue by helping fans trade Offspring material. A settlement between the two parties will see the band continue to sell the merchandise with the funds going to charity.

However, the threat of legal action against sites such as Napster has had little effect. In fact, the possibility of a shutdown might have made the problem worse by publicising the service. This year, use of Napster has grown by more than 345% in the US alone.



▲ Madonna: telling cybersquatters to belt up

Who's swapping who?

Some popular musicians find it hard to imagine that music swapping will affect their sales. "I'm not really worried by Napster," Sharleen Spiteri, singer with Scottish rockers Texas, said in an online chat. "I think people that buy records will always go and buy them to get the whole package."

Some artists meet the threat of online swapping and other forms of piracy head-on by releasing literally everything that fans might want to lay their hands on. For instance, Pearl Jam issued individual CDs of 25 concerts from their European tour earlier this year in an effort to stop these shows being bootlegged.

Other musicians allow fans to listen to their songs through official Web sites, but use streaming technologies to restrict their distribution. Madonna's approach is typical. She used a Web site as a key promotional tool for her new album, *Music*. The site offers lyrics to all the songs on the album, but it stops short of offering direct downloads of any of the tracks. Instead, it uses streaming QuickTime files embedded within a Flash viewing system. The title single from the album was briefly available on the site in remix form as an MP3, but to access it, fans were asked to prove US residency by providing their home postcode.

Madonna is also defending her cyber-rights in other ways. She has taken Dan Parisi to the World Intellectual Property Organisation (WIPO) domain arbitration board, seeking to reclaim the domain name *madonna.com*. (Parisi also operates the infamous *whitehouse.com* adult site.)

Licence to limit

Madonna's postcode requirement relates to one of the complications faced by record companies that want to provide downloads. Many record company contracts only cover a specific territory. Offering freely accessible downloads could result in the company being sued by the artist, or by a rival record label in a different country.

For supporters of free music swapping, this problem highlights the flaws in the current music industry model. Ideally, they argue, bands could maintain direct contact with fans and distribute music to them without the need for an intermediary label.



▲ The Net catches the tunes that Smashing Pumpkins' label rejects.

Some artists have succeeded in doing just that. Former Byrds member Roger McGuinn testified to the US Congress earlier this year that he had made thousands of dollars by selling MP3s from his site. Even artists with conventional record company contracts, such as David Bowie, have profited with subscription-only sites that provide access to rare recordings. Some acts, such as the soon-to-implode Smashing Pumpkins, plan to use the Net to release material that their labels have refused to issue. The Pumpkins are using the Net to freely distribute material planned for an album of rarities, *MACHINA II/The Friends and Enemies of Modern Music*. The group's label, Virgin, declined to issue the material after poor sales for the group's previous CD.

Some groups, such as Metallica, want to shut down free distribution services. "We believe that our fans, and in fact most people in this country, are as uncomfortable as we are with the idea that stealing, by whatever means, is OK," the band said following the first rulings in the Napster case. Musicians "are entitled to the same copyright protections online that they have traditionally been afforded offline".

Whether consumers agree is another matter. A report issued in September by Forrester Research predicts that record companies will lose \$US3.1 billion in business by 2005 as artists "do an Offspring" and distribute content independently. "Regardless of whether they consider Napster right or wrong, traditional publishers must focus on beating Napster at its own game," analyst Eric Scheirer said. "They must create compelling services which the consumers want, in the formats they want, using the business models they want."

Angus Kidman

Best ever 3D platformers

Every serious gamer has played a platform game at one time or another. At one stage, platform games were the staple of gaming, especially among the console community. Newer machines and better graphics capabilities have led to a new generation of three-dimensional platformers. Which titles have made the jump, and which should be consigned to the pit of eternity?

Tomb Raider 1 to 4

She's probably had more written about her than any game character since Pac-Man — and it's no surprise. Lara Croft stars in a quartet of very good 3D platform/puzzle games.

They're more on the cerebral side than the button-mashing, creature-killing side, and that tends to be overlooked in the rush to write about how much of a good or bad role model she is. All we know is that pretending to be Indiana Jones has never been so much fun.



Mario 64

Like him or hate him, Nintendo's corporate mascot with the silly Italian accent spawned the whole 3D platformer concept. There were other titles, such as the abysmal Jumping Flash which preceded Mario, but without his

success, very few businesses would ever have put the time and money into developing the quality 3D platformers that we enjoy today.



Crash Bandicoot

Sony continues to deny that this character is the system mascot, but after three platform games and one highly addictive racing game, it's not fooling anybody. His platform adventures tend to be a little more linear than your average 3D

platform game, but they're bright and appealing, and not too hard for gamers of all skill levels. Plus, who can resist seeing a bandicoot in board shorts fleeing from a boulder?



MediEvil

MediEvil is best described as Ghosts 'N Goblins 3D, as even the hero is a ghost. Throw your own arms at foes, jump out of the way of killer scythes and defeat evil in one of the best PlayStation platformers not to feature marsupials or apes. Platform games have tended to be a console thing, and even in the age of 3D accelerators this is still largely true. This game shows you why, and the sequel's just as tasty.



Pitfall 3D: Beyond the Jungle

What happens when you take the single oldest platform licence, turn it into 3D and add vocal quips by Bruce Campbell? You get Pitfall 3D, that's what. Available cheaply for the PC and PlayStation, it's an enjoyable romp through otherworldly jungles with

plenty of vine swinging, gem collecting and sudden drops to your inevitable death to look forward to. It's not the hardest game to complete, but for old school gaming fans, it's a must.



Sonic Adventure ✓

FPS and 3D platformers share a common problem: they create profound levels of motion sickness in some people. If this describes you, don't even go near Sonic Adventure. This Dreamcast game beats every other game for sheer speed. Send the familiar blue 'hog through spinning, scaling, meticulously detailed, but above all super, super, super-fast levels. But don't blame us if you end up feeling dizzy.

**Nights** ✓

This is only partly a platform game, and it defies description any other way, but it's simply the best game ever put out for Sega's now-defunct Saturn console. You play either of two kids and their dream buddy Nights, and your aim is to collect gems. This is a bizarre combination of platformer and flight sim (we're not kidding), which shows that even programmers have easy access to mind-altering drugs.

**Ape Escape** ✓

What could be more fun than a game involving time travel, geeky kids and the opportunity to net simians? Ape Escape is one of the few PlayStation games that require the dual shock analog pad, but its use of both sticks, its fun cartoonish approach and, heck, the fact that it inserts monkeys into any game, make it an instant classic.

**Hexen II** ✓

Following the success of Tomb Raider, Raven Software decided to forego the first person shooter style of the original Hexen and apply a third person 'over the shoulder' perspective to the sequel. It succeeded marvellously, and is thoroughly enjoyable from start to finish. It has some very impressive visual effects and great plot and level development. Hexen II is certainly one of the best combinations of a fantasy theme with an action title.

**Die by the Sword** ✓

If you have three hands, this is the game for you. A fantastic plot, loads of character and some great graphics for its day make this medieval combat dungeon crawler one of the best PC platform games available. The catch is you need coordination. Lots of it. Combat is handled by swinging your sword with the keypad — the button determines the relative position of the weapon, and you swing it by moving it around. Want to sweep? Press 1, then 3. Hold down Insert to extend the arm a bit further. Press C to crouch while you're doing it. Some very impressive combinations are possible. For the less coordinated, there's a much simpler arcade mode. DBTS provides one of the most innovative combat systems to date, but you need at least 15 fingers to coordinate all of the buttons that need to be pressed.

**High jumpers** ✓**Earthworm Jim 3D****Banjo-Kazooie****Donkey Kong 64****Legacy of Kain: Soul Reaver**↑**Let them fall** ✗**Bug****Jumping Flash****Prince of Persia 3D****Star Wars: The Phantom Menace**↑

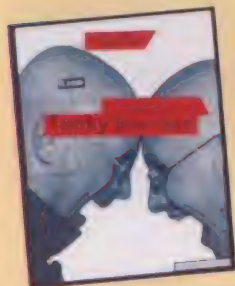
Video games, ebusiness and drugs and
music in Manchester.

Funk, groove and video games

Funky Business: Talent Makes Capital Dance

Funky Business is a 21st-century Swedish version of Marshall McLuhan's *The Global Village*, except the village is now funky.

This is largely a 'me too' book. Its central premise is unoriginal: that thanks to globalisation and digitalisation, physical location is no longer relevant. What makes companies successful is the way their people think. It includes everything you'd expect: competition, the search for differentiation, the need for organisational innovation, and coping with chaos. However, some of the content is excellent, such as the discussion on "economies of soul", which suggests we need to stop viewing people as a resource.



The first three-quarters of the book lacks direction, continuity and flow and it is more like a meandering set of exposés that lead nowhere. However, if you persevere, it all

comes together in the last quarter. Here the authors bring the discussion down to a personal level and talk about how you can determine your own success.

The book pays little attention to the role of technology as a "force of funk", with only about 10 pages given over to a specific discussion on technology as a driver of change.

The style is refreshing, unique, and purposefully brazen. *Funky Business* is an interesting, but not revolutionary, read.

Cathie Kennedy

Authors Jonas Ridderstråle and Kjell Nordström

Publisher BookHouse Publishing AB

Contact Pearson Education

Phone (02) 9454 2319

Price \$38.80

ISBN 0273645919

Rating ■■■■■■■■

Needle in the Groove

If you've ever read any of Jeff Noon's novels or short stories, you'll know what to expect with *Needle in the Groove*. The trendy settings, marketing speech turned common lingo, and descriptive way he conveys feelings, thoughts and emotions draw you right into the action. When Noon writes about the effects of music or drugs, you are there. The music and the drugs are not the stuff of today, but a strange mix of retro-futurism.

Needle in the Groove marks a small departure from his other works; it deals less with society as it is and more with the music and drugs aspects of Manchester's future. Music is a dominant theme in this book. The story follows Elliot Hill, a bass player who joins a new band comprising a singer, drummer, DJ and some incredible new recording media. On the eve of stardom, one of the band members disappears. Elliot has to search back through a disturbed past to save the missing musician.



Noon uses the musical references inventively throughout the novel. Some chapters are 'remixes' of earlier ones, gradually unfolding and expanding on previous versions. Even sentences are written like lyrics from a record sleeve, an experiment that Noon will take further in

his next collection of short stories, due out later this year. The book is not as sci-fi based as *Vurt* or *Nymphomation*, and the storyline leans more towards *Pollen* (with shades of *Vurt*). A companion CD to *Needle in the Groove* is sold separately.

Darren Ellis

Author Jeff Noon

Publisher Random House

Contact Random House

Phone (02) 9954 9966

Price \$29.40

ISBN 1862300917

Rating ■■■■■■■■

Trigger Happy: The Inner Life of Videogames

Trigger Happy isn't an account of the relationship between violence in video games and violence on the street. It's a book about the pleasures of video games. As author Steven Poole writes, "The post-pub PlayStation session is one of the few joys of modern British life".

In discussing the ways animation, story-lines, soundtracks and characters of video games are designed to entertain, Poole also asks whether video games are art. A composer of music for television and short films, he pays particular attention to the role of music in video games. Poole prefers much of the "remarkably inventive" music from the Commodore and Amiga era to the music in contemporary games, and makes suggestions on how it can be improved.

Video games are rapidly overtaking cinema as the most lucrative sector of the entertainment industry, and some observers predict a future where games

and film converge. Poole demonstrates how film and video games have influenced each other, but he disagrees with the idea that they will ever become the same thing.

This is because film and games media work in different ways: "Film manipulates the viewer, but a game depends on being manipulable".

Poole treats the medium of video games to the kind of serious consideration usually reserved for high art. "For most of my generation, videogames are just part of the cultural furniture." Like furniture, video games can be ugly, but sometimes they really are works of art.

Glenn Phillips



Author Steven Poole

Publisher Fourth Estate

Contact Allen & Unwin

Phone (02) 8425 0100

Price \$29.95

ISBN 1841151203

Rating ■■■■■■■■

Wild animals

Elephant Gun

Elephant Gun's new album *Albino* explores a range of rock genres. Since their self-titled EP was released in 1998, the band has toured with rock legends such as Shihad, Grinspoon and The Screaming Jets, and has recently found radio success with the release of *Albino*.

"The response to the album has been fantastic, so many people have contacted us, in person or via email, to let us know what they think. Everyone has been really positive, we just need maybe 80,000 more people to buy it and enjoy it," Elephant Gun bass-player Sean said.

Perhaps surprisingly for a rock outfit, the *Albino* album has proved to be very popular on the Metalshop site (run by Roadrunner Records). "I think we have a real crossover sound that metal fans can

relate to. A lot of metal fans have bought the album because it is on the Roadrunner label and then been surprised that it isn't heavy, heavy metal, but they have a listen anyway and most seem to come around and enjoy what they hear."

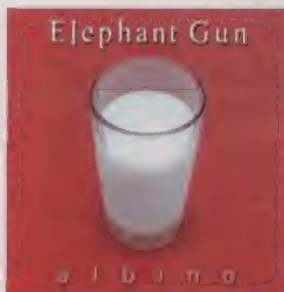
The band is taking a break after recently completing a tour, but they will be working on their Web presence. "A Web site is definitely on the way. We want to have a great site that is updated often, so people know they are getting current info."

Sean has some reservations about MP3s. "I think we have to be careful how we

use MP3s; it makes it really hard to pay people who are responsible for the music. Musicians are the last people to get paid and it is the hardest job in the world to make a living with."

The two tracks selected this month provide a taste of the band's ability to cross between melodic, acoustic-style tunes and heavy-riffed rock anthems.

● Visit apcmag.com for a chance to win a copy of *Albino* or the single *Cataract*.



Tracks Missing Mile
Cliché
Online theelephantgun@hotmail.com

The Wolves

The Wolves describe their music as "uncompromising power-thrash, combined with relentlessly brutal grooves", and their solid metal sound has found an appreciative audience online.

Following a gig at the Metal for the Brain festival at Canberra University on October 28, The Wolves will begin a national tour in Victoria this month to promote their brand new self-titled album, released on Dark Carnival Records.

Since they formed two years ago, the Melbourne-based band has played live all over Australia, and they have performed

with a range of international acts. One of their biggest gigs was as support for Slipknot last year, and they were the only metal band to play at Big Day Out 2000.

Radio and TV generally pay little attention to metal, but the strong undercurrent of online fans reflects an extensive local scene. The Wolves have had great success on MP3.com.au charts

throughout this year, and held a live chat session on the site. They are currently working on their own Web site.

When touring, the band found their online reputation had preceded them, and when they recently started playing under-age gigs they were surprised by the big turnout.

'Psy-Killer' and 'Evil Things' epitomise The Wolves' ferocious guitar-driven style.

Vanessa Richardson

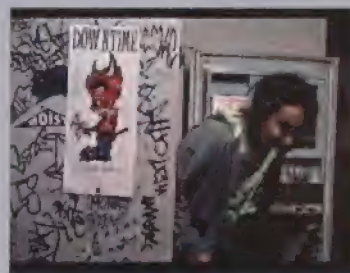


Tracks Psy-Killer
Evil Things
Online mp3.com.au/thewolves

Embark on an audio adventure into pure rock and furious metal.

Downtime on video

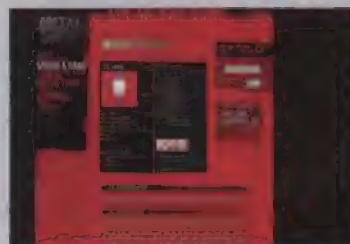
Last month, Random Notes featured 'April' and 'Monkey' from Downtime's latest album, *Tooth & Nail*. This month, see the Sydney hardcore band crawl out of the fridge and perform live in the 'Monkey' videoclip.



Metalshop

Australian metal fans have been storming the Metalshop site (metalshop.com.au) since it was set up at the end of last year. Content manager Pheona Donohoe has been overwhelmed by feedback on the site, and by the traffic it is generating. "Metalshop has not spent any money marketing the site, yet it gets as many hits as sites such as ChaosMusic, sanity.com.au and juice.net." The most popular sections of the site are competitions and news — and audio and video downloads, of course.

Metalshop has huge plans, including a radio service, and at the time of writing is preparing to launch a free home page hosting service, called The Beast. It is also setting up a classifieds section and expanding the catalogue of CDs for sale on the site. CDs from Elephant Gun and The Wolves are available on Metalshop.

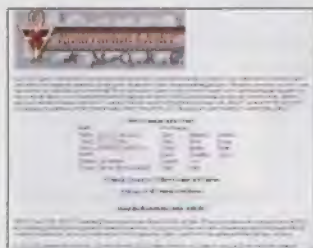


Holier than thou

With Advent just around the corner, APC thought it an appropriate time for personal reflection. These 'religious' sites – some serious and some not so serious – will lead you on the path to spiritual enlightenment.

AMORC: The Rosicrucian Order

The AMORC (Ancient Mystical Order Rosae Crucis) Web site is disappointingly sober and basic for an organisation that promises to "reveal the underlying principles of the universe based on natural and spiritual laws". Little more than a brief introduction to the Rosicrucian Order, and a list of branches and contact addresses, the site gives away few of the order's secrets. You can "master your life, and make a difference in the world", but you'll have to contact them to find out how.



Online www.amorc.org
Rating ■■■■■■■■

Suzanne Fraser

Church and School of Wicca

Under the bewildering motto "an it harm none, do as you will", CASOW has been "bringing magic to the masses" since 1968. The Web site is attractive and well organised, and its Witch Stuff sales catalogue makes sourcing all your essential shamanic, astral travel and sorcery products a breeze. A bimonthly student magazine, 'Survival', is also available, and you can sign up for correspondence courses on topics like mystical awareness and practical sorcery. Blessed be!

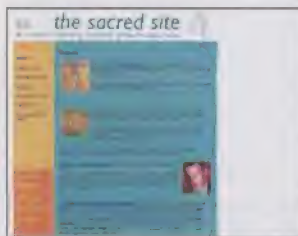


Online www.wicca.org
Rating ■■■■■■■■

Suzanne Fraser

Compass

Based on ABC TV's religious program *Compass*, this visually boring but thought-provoking site explores a wide range of contemporary social, political and religious issues. It encompasses everything from indigenous beliefs to the views of groups thought by many to be cults or sects. For balance, there are links to sites critical of individual religions. As well as upcoming stories, you'll find an archive of past stories and a chance to have your say on any of the issues covered.

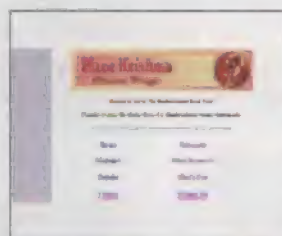


Online www.abc.net.au/compass/about
Rating ■■■■■■■■

Gail Lipscombe

Hare Krishna

Nowhere near as colourful and alluring as the displays its members put out on street corners and airports worldwide, the Hare Krishna home page is nonetheless a highly functional centre for those interested in beginning an association with the supreme Rama. There are links galore to more in-depth sources on Hare Krishna as well as a comprehensive list of contacts for taking the spiritual journey into the real world. There are also divine (in the truest sense of the word) Hare Krishna recipes available.

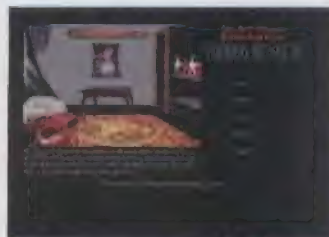


Online www.harekrishna.com
Rating ■■■■■■■■

March Stepnik

Interactive Voodoo

Apparently, voodoo has had bad press; it's not about inflicting pain on others, but about reaching a higher consciousness through Kundalini — "the river inside". Learn about voodoo history at the Voodoo Museum, or sign up for the New Orleans Cemetery walking tour or the 'Tour of the Undead' after dark. You can also shop online for lotions, potions and voodoo dolls. Personally, I think the inflicting pain thing was rather appealing.



Online www.voodoo-museum.com
Rating ■■■■■■■■

Gail Lipscombe

Logos and Symbols of Secret Societies

Religious symbolism has existed since the dawn of time, but esoteric symbols and their meanings take on a whole new dimension in the world of occultism. This simple yet intriguing Web site helps to demystify some of these secret symbols; clicking on 'What is a symbol' will lead you to an interesting discussion of masonic and occult symbols. However, there is no explanation of the dubious inclusion of the International Monetary Fund and America OnLine logos.



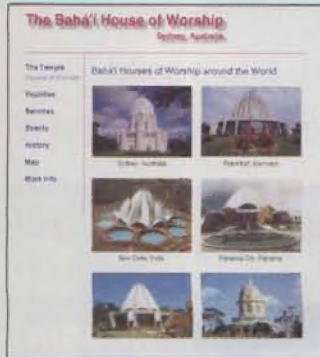
Online mercury.spaceports.com/~persewen/logos_index.htm
Rating ■■■■■■■■

Vanessa Fazzino

The Bahá'í Faith in Australia

Those seeking a traditional religious experience will not find it in the Bahá'í Faith, a religion for the modern-day world. Founded by Bahá'u'lláh, a Persian nobleman, Bahá'ís belong to the youngest and one of the fastest-growing 'independent' religions of the world. Its community of 5 million subscribes to a doctrine of "a single humanity united in a global society".

Bahá'í communities can be found all over Australia. The faith was established here in 1920, and has grown to encompass more than 10,000 Australian members.



Online www.bahai.org
Rating ■■■■■■■■

Vanessa Fazzino

Yoga In Daily Life

This site provides an enlightening look at the ideas that lie behind yogic teachings. Yoga In Daily Life is a teaching of yoga founded by Paramhans Swami Maheshwarananda — Swamiji, for short — and is a "comprehensive system concerning body, mind, consciousness and soul". Yoga is considered a spiritual path, and yogis view God as "a universal principle, cosmic light, eternally awake consciousness which pervades all existence".

Yoga In Daily Life is well designed and varied. It includes vegetarian recipes as well as audio clips, downloads of Indian spiritual songs and Swamiji's latest talks.



Online www.yoga-in-daily-life.org
Rating ■■■■■■■■

Lindsay Hayman

NSW Masons

According to its doctrine, freemasonry is not a religion. However, a belief in the Supreme Being is a requirement for membership. If you want to find out what lies behind the ceremonial aprons, collars, gauntlets and jewels that freemasons are required to adorn themselves with, Australian Masonry contains some

informative answers, as well as some interesting insights into its history. Unfortunately, I didn't find any clues to what it was that my father used to memorise night after night from his 'little black book'...



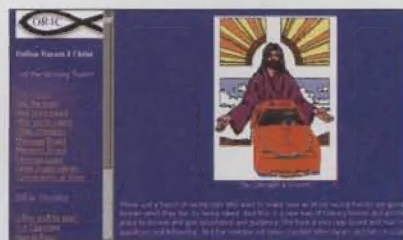
Online www.uglsw.freemasonry.org.au
Rating ■■■■■■■■

Lindsay Hayman

Online Racers 4 Christ

It's not initially apparent what Online Racers 4 Christ is all about. This is remedied in the second paragraph on the home page, where the Webmaster explains the group: "We're not here to cram religion down your throat or beg for money. We're here to simply give you the information you need to be saved

from hell." Once you are saved, membership can be granted, opening up a glorious new world for you, where your passions for Christianity and for racing can exist as one. Well worth the effort, we say!



Online www.brightdsl.net/~spin17/or4c
Rating ■■■■■■■■

March Stepnik

The Church of the SubGenius

"Eternal salvation or triple your money back!" is the promise of the Church of the SubGenius, a 'religion' founded in the US in 1980 by Ivan Stang. For \$US30, you can become a minister of the church and promote the virtue of 'slack'. The church's logo is a smiling man with

a pipe between his teeth, otherwise known as Reverend Bob Dobbs. His image appears all over the site, which combines the iconography and rhetoric of advertising, conspiracy theories, Scientology, Christianity and self-help movements. If you can understand it, please explain it to APC.



Online www.subgenius.com
Rating ■■■■■■■■

Glenn Phillips

Reverend Billy

Reverend Billy is taking his sermons to the streets. In fact, he's taking them to the shops. The Reverend Billy is a "performance propagandist" who fronts the Church of Stop Shopping, and regularly invades shopping chains such as Starbucks and Disney

Stores with his street theatre. The Reverend doesn't like the culture of consumerism, and particularly dislikes Starbucks, because he believes that it replaces diverse coffee shops with homogenous shopfronts. His site has guides for staging your own shop invasions, and the internal Starbucks memo about Billy makes for hilarious reading.



Online www.revilly.com
Rating ■■■■■■■■

Glenn Phillips



The geek pilgrimage

With special-interest package tours growing in popularity every day, it's only a matter of time before groups of aging geeks begin signing up to visit the world's technology hot spots. Get in ahead of the crowds with Chip Chat's handy guide to your own personal technology pilgrimage.



- 1 SILICON VALLEY:** Be sure to go to 1 Infinite Loop, where Apple's headquarters are, and say, 'Hey! I can see the end of the road!'.
- 2 ISRAEL:** Israel has developed a flourishing IT industry. Take a picture and send it to Richard Alston.
- 3 CANBERRA:** Visit the Australian Broadcasting Authority, where there's a small list of sites banned under Net censorship laws. You won't be allowed to see it, but this is as close as you'll get.
- 4 IRELAND:** A world centre for technology manufacturing and development. We understand leprechauns charge very low rates.
- 5 BANGKOK:** Where else can you buy a set of CDs featuring every commercial release of Windows for a small handful of rice?
- 6 SEATTLE:** This is where Windows was developed. All its citizens are probably going to burn in hell for all eternity.
- 7 FINLAND:** Or as Monty Python once put it: "Finland, Finland, Finland, the country where I quite want to be". Linux was built here, you know.
- 8 AFRICA:** Frankly, as a technology continent, this is skippable.
- 9 RUSSIA:** Mother country to Krasnoyarsk, the home of barelylegalteens.com.
- 10 BRAZIL:** Local resident Juan Del Fuego has a stunning resemblance to Larry Ellison.
- 11 CANADA:** Blame Canada! Home of Corel and French-speaking people.
- 12 SWITZERLAND:** Spiritual home of APC's art director.
- 13 PACIFIC OCEAN:** They'll never find the bodies.

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"I did it in 43.55 seconds."

Don Knisley, Network Engineer, US Air Force

Snap Servers are engineered for one purpose: file sharing. That's why Don could have a Snap Server 2000 up and running on a LAN in 43 seconds! "If I had the choice of installing an NT server for network storage or a Snap Server, I'd pick the Snap Server," says Don. "It's fast, easy and the browser configuration tool is very intuitive." According to a recent PC data report, 4 out of 5 workgroup network attached storage (NAS) servers sold are Snap Servers. That's why Snap Server is the worldwide leader and most awarded NAS product on the market today. Simply contact our distributors/reseller partners or visit our website at www.snapserver.com/apac for more information.



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- Configuration via Web browser

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